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THE WOODY PLANTS OF THE BECHUANALAND PROTECTORATE

By O. B. Miller.

FOREWORD

Forest officers have played no small part in contributing to our knowledge of the flora of South Africa. Outstanding contributions have been made by such well-known men as Sim and Henkel. The present work by O. B. Miller is a most useful and valuable record of the vegetation of that part of South Africa which is least known to the botanist and the public in general. Although the country dealt with is some 275,000 square miles in extent, it is so sparsely populated that the total population is barely one person per square mile. Miller draws attention to the fact that the country is covered mainly by a mixture of woody and herbaceous plants and that there is very little natural grassland, which serves to emphasize the fact that the density of population and its welfare in general is largely dependent on the extent and condition of natural grassland.

Miller first became acquainted with the forests of South Africa when he joined the Forest Service of the Cape of Good Hope and was appointed to the Transkei (1907—1910). With the advent of Union he was appointed Assistant District Forest Officer in the Transkei, and from this time onwards, apart from his war service with the Royal Field Artillery in France during the 1914—1918 war, he was employed almost continuously on the demarcation of the indigenous forests of the Transkei. In 1925 he was appointed District Forest Officer at Kokstad from which post he resigned some two years later. After a short sojourn in Northern Rhodesia Miller returned to South Africa and joined the Colonial Service. He served for a short period in Swaziland and then joined the service of the Bechuanaland Protectorate.

Miller's interest in the identification of trees and shrubs dates from his appointment in the Transkei where he not only made a large collection of

1

plants and became familiar with them but also made it his business to know the native names of the plants as well.

It is a far cry, however, from the forests of the Transkei to the forests of the Bechuanaland Protectorate and there is little in common between them. Nothing daunted, however, Miller set himself to study these dry forests of Bechuanaland which was no mean task as the country was almost devoid of road, was for the most part waterless, uninhabited and often featureless as well. Nevertheless he has not only given us a list of the chief components of the woody vegetation but has compiled a list of their native names as well, which is a specially valuable feature of this present work.

This pioneer work of Miller's in Bechuanaland has laid a sound foundation for future botanists to build on and one hopes that the time is not far distant when similar work will be undertaken and published on the vegetation of the Protectorates of Basutoland and Swaziland.

Miller's work will stand for all time as a valuable contribution to our knowledge of the woody plants of the Bechuanaland Protectorate and great credit is due to the Director of the National Botanic Gardens, Kirstenbosch, in arranging for its publication in the Journal of South African Botany.

Irene,
24.3.52

I. B. Pole Evans.

PREFACE.

The "Woody Plants of the Bechuanaland Protectorate" is really an enlarged "Check-Lists of the Trees & Shrubs of the British Empire, No. 6, Bechuanaland Protectorate" which was published under the auspices of the Imperial Forestry Institute, Oxford in 1948. Since that date a large number of fresh species have been gathered and a certain number of corrections in identification made at Kew, the National Herbarium, Pretoria and at the herbarium of the Imperial Forestry Institute.

For these my thanks are due to the Director of Kew and Mr E. Milne-Redhead of Kew Herbarium; to the Chief, Division of Botany & Plant Pathology and Miss R. Robertson and Miss J. Elffers of the National Herbarium, Pretoria; and to the Director of the Imperial Forestry Institute and Mr F. White. I must also thank various members of the Bechuanaland Protectorate civil service for obtaining specimens to confirm certain vernacular names.

O. B. Miller.

Serondela.
1952.

Introduction.

In the following pages will be found a list of the woody plants of the Bechuanaland Protectorate mentioned in the literature available to the writer and, as far as possible, collectors' names and collection numbers. This does not mean however that all the material here referred to, distributed in many different herbaria from Cape Town and Pretoria to London and Zürich, has been examined.

As an aid to identification in the field, the vernacular names of the plants whenever obtainable have been given. The average tribesman has a good knowledge of his own plants, but is not infallible, so a brief description of the plant's most obvious characteristics has been added. The times of flowering have been watched over a number of years and are also given; beside the seasonal variation, one must allow for a range of 900 miles of latitude.

The principal collectors whose specimens are mentioned are:—

Major and Mrs. E. J. Lugard who worked mainly in the Kwebe Hills of Ngamiland. They gathered 374 species several of which were new. Their collection was described by N. E. Brown (2).

Dr Bremekamp (3) describes 204 species (omitting those already described by Brown) which were gathered by Dr van Son during the Vernay-Lang Expedition of 1930.

Dr I. B. Pole Evans' (17) collection of 1931 is listed in "A Reconnaissance Trip through the Eastern Portion of the Bechuanaland Protectorate", but that of 1937 is not given in "An Expedition to Ngamiland". His excellent descriptions and photographs of the country and its flora deserve special attention.

Dr H. H. Curson's (7) list is not included in his "Notes on the Flora of Ngamiland and Chobe". It numbered over 800 specimens. This excellent illustrated pamphlet also deserves attention.

Over a thousand of my own collection of nearly 1200 specimens in the Forest Herbarium at Pharing were destroyed by fire in 1950. Fortunately in nearly all cases, duplicates were sent to one or more of the herbaria mentioned in the Preface. A few specimen numbers of this collection cannot now be traced.

Small collections were made by Harbor and by Marloth in Mochudi district; by Miss O. Hillary and Miss R. Robertson at Pharing and by Miss Robertson and Miss J. Elffers at Serondela.

In the somewhat distant past are such well known names as Holub, Passarge, Seiner, Chapman and McCabe, whose accounts of the country they passed through gave the world its first conception of the flora of the Protectorate.

The woody plants are arranged according to the System of Engler and Prantl, thus agreeing with that used by Thonner in his "Flowering Plants of Africa", but genera and species are placed alphabetically.

As to the vernacular names: 'g' is a guttural in all true Tswana languages; otherwise it is the ordinary hard 'g'. Certain plant and place names of Bushmen origin have the clicks represented by 'c', 'q' and 'x'. "mu-", instead of "mo-" would more correctly represent this prefix to so many names used by the non-Tswana tribes of the northern Protectorate, but the Tswana orthography has generally been used.

In addition to the systematically arranged list of trees and shrubs, there is an alphabetical vernacular list of both woody and herbaceous plants. Here an attempt has been made to conform with the orthography of the various tribal languages.

Brief Description of the Bechuanaland Protectorate and its Main Vegetation-Types.

Area. The Protectorate is a country of some 275,000 square miles, extending from the Zambezi River in the north, through nine degrees of latitude, to the Molopo River in the south. It is 630 miles from east to west at its widest. The southern tropic crosses the railway line about thirty miles south of Mahalapye.

Of the quarter of a million square miles, five blocks of European-owned farms account for 7,500 square miles, the Crown lands of Chobe and Kalahari for 165,000. The remainder is Native Reserve.

Population. The Census of 1946 shows a total population of rather over a quarter of a million people of all races, *i.e.* about one per square mile largely concentrated on the eastern border. The total of those of European descent is 2,325; 96 Asiatics; 1,708 'Coloureds'. The 248,000 Natives include an estimated 20,000 Bushmen.

Climate. To avoid a lengthy account, meteorological data from three widely separated stations have been tabulated. These stations are

Station	Temperature in degrees Fahrenheit				Rainfall in inches	Relative Humidity	
	mean annual max.	mean for hottest month	mean annual min.	mean min. for coldest month	mean annual	lowest month	highest month
Tsabong ..	84·2	Dec. 94·2	50·3	(July) 33·0	11·79	Nov. & Dec. 50	May & June 76
Kanye ..	77·5	Jan. 85·6	54·4	42·1	20·58	Sept. & Oct. 58	March 73
Kasane ..	86·1	Oct. 94·7	57·6	45·5	26·55	Oct. 41	Feb. 75

Tsabong in the southern Kalahari, Kanye as representative of the well-populated eastern strip, and Kasane in the extreme north with the highest rainfall, well within the tropics.

The outstanding climatic features are—the long late-autumn, winter, early-spring drought period; the low relative humidity; the severity of the frosts induced by the altitude of the 3,000 to 4,000 feet high plateau.

Vegetation. Except for relatively small areas, the country is covered by a mixture of woody and herbaceous plants, 'savanna-woodland' in its broadest sense; 'trees, isolated or in groups, the ground surface with a continuous or interrupted cover of herbaceous plants, principally grasses. The dry season is prolonged and the range of temperature great'. Except for a very few fringing forest species, trees and shrubs are leafless during winter.

There is very little natural grassland, *i.e.* grass unmixed with other plants. When it does occur, it is the result of prolonged inundation, as in the Okovango Delta. Many square miles, especially in the southern Kalahari, appear at first sight to be pure grassland. The trees and shrubs have been destroyed by fire and their coppice and root suckers may be found still growing, half hidden by the grass. Given protection, the land would revert to woodland.

Savanna-woodland is replaced by fringing forest along the edges of 'wet' malapos (flat, usually bankless, grass-covered drainage channels) and on the banks of permanent and intermittent rivers like the Chobe and Limpopo Rivers and the streams of the Okovango Delta. In these narrow belts closely-grown trees, some of them sixty feet high and more, form a top storey above smaller trees and shrubs. The humus-rich floor supports a dense cover of tall grasses and other herbs; or where the shade is dense, the ground is bare.

The best savanna-woodland is found in the Chobe District, where Mokusi country occurs. Leaving this behind him, the traveller, as he progresses southward, finds that the lower rainfall and the increasing severity of the frosts cause a deterioration in the quality of the stand, which becomes more open and the height-growth less. The decrease in the number of species is progressive until in the southern Kalahari, only four kinds of trees are represented. (See 'Southern Kalahari', O. B. Miller(14).)

The Main Vegetation-Types. Irvine (11) in the Northern Transvaal and Henkel (9) in Southern Rhodesia, have plotted in considerable detail the sub-types on our eastern border. It will be many years before this country with its vast unoccupied spaces can be mapped with the same degree of accuracy. The vegetation-types given below are therefore mere tentative suggestions.

1. THE NORTHERN portion of the Protectorate as far south as the southerly limit of the Mopane (*Colophosperma mopane*).
Sub-types.

(*a*) Mopane country. *Colophosperma mopane* dominant, usually pure as mopane woodland, mopane tall coppice or mopane scrub—the two latter forms are the result of fire. (Once burnt out, frosts may destroy the regrowth.)

(*b*) Mokusi country. *Baikiaea plurijuga* is the characteristic and often the dominant species. Others are mukwa, *Pterocarpus angolensis;* mupomena, *Entandrophragma caudatum;* mongongo, *Ricinodendron rautanenii*, all timber trees, with the shrubs *Popowia obovata* and *Bauhinia macrantha*. (See O. B. Miller (13).)

(*c*) Mogonono country. Sandy soils with *Terminalia sericea* and mosheshe (*Burkea africana*) dominant.

(*d*) Delta country, consisting of fringing forest, island country and grassland. Island country is seasonally flooded plain, dotted with large termite mounds which have become joined together and may be several acres in extent. These carry much the same vegetation as fringing forest—mochaba, *Ficus sycamorus;* mopororo *Lonchocarpus capassa:* mokochong, *Diospyros mespiliformis;* mokoba, *Acacia nigrescens;* a characteristic member of the association is the *Hyphaene* palm. *Garcinia livingstonei* is a true evergreen and many of the others are sub-evergreen.

(*e*) Acacia country. Plains where inundation for long periods has ceased, such as the bed of Lake Ngami, now carry a dense stand of Camel Thorn, *Acacia giraffae* with an occasional *A. litakunensis*. Elsewhere *A. giraffae* is often dominant, but many other acacias are there too. For a fuller description see Curson (7).

2. THE NORTH-EASTERN area where the characteristic tree, though seldom dominant, is mokoba, *Acacia nigrescens*. Other characteristic but more locally distributed trees are Baobab, *Adansonia digitata;* morula, *Sclerocarya caffra* and *Sterculia tomentosa*. The sub-divisions are:—

(*a*) *Terminalia sericea-Combretum* spp.
(*b*) *Terminalia-Burkea africana* on lighter soils than (*a*).
(*c*) *Acacia* spp.—*Dichrostachys glomerata*.

3. THE EASTERN area, a fifty-mile wide strip to the south of No. 2. Sub-divisions are:—

(*a*) *Acacia* spp., principally *A. litakunensis*, dominant in the valleys.
(*b*) *Combretum* spp.—*Terminalia sericea* on ridges and hills.

(*c*) The almost pure, large-grown Camel Thorn, *Acacia giraffae*, of the Baralong farms in the south, on dolomite.

(*d*) *Rhus apiculatum;* almost pure on shallow-soiled, stony, ferruginous quartzite hills; *e.g.* between Ootsi and Ramoutsa railway stations.

4. THE SOUTHERN KALAHARI, where the only tree species are motlopi. *Boscia albitrunca;* mokwelekwele, *Acacia gillettiae;* the Camel Thorn, *A. giraffae* and mongana, *A. detinens*. For fuller description, see 'Southern Kalahari', O. B. Miller (14).

5. THE MIDDLE KALAHARI. Here the number of species is much greater than in No. 4. A notable feature is the occurrence of densely-grown copses of from a half to many acres in extent in which the timber tree morukuru, *Spirostachys africana* is dominant. This is found over an area of some 1,800 square miles in the Kwena, Kgatla and southern Mangwato districts.

THE WOODY PLANTS OF THE BECHUANALAND PROTECTORATE

SALICACEAE

SALIX L.

Willow. Trees or shrubs growing near water. Flrs in catkins.

1. **S. subserrata** Willd.

Shrub to 10 ft high. Locally abundant at Kasane Rapids on Chobe Riv. Frts with dingy white hairs; brchlts red; lvs. altern., glaucous, grey below. *Miller* B/946. *Rob. & Elffers* 51.

MYRICACEAE

MYRICA L.

1. **M. conifera** Burm. f.

Shrub 8 ft high, of moist places. Lvs. simple, deeply toothed; Flrs spicate. See Thonner pl. 29. *Miller* B/438.

ULMACEAE

CELTIS Tourn.

1. **C. africana** Burm, f. (syn. *C. kraussiana* Bernh., *C. rhamnifolia* Presl.) modutu (G.S.P.) mogotiri (Tlhok.)

Tree to 20 ft high, of moist spots. Bark smooth, light grey; lvs. simple, nettle-like; flrs (Sept.) inconspicuous; wood pale, with good elasticity. *Miller* B/218, B/653, B/876.

MORACEAE

FICUS L.

Wild Fig. Lvs. simple, altern. Flrs contained within a receptacle and pollinated by insects. Frts usually globose, pulpy. Juice milky.

1. **F. burkei** Miq.

moumu (Taw.)

Tree 40 ft high on bank of Okovango Riv. at Shakawe, Ngamiland. Many aerial roots. *Miller* B/432. *Pole Evans* 4138.

2. **F. gnaphalocarpa** A.Rich.

"A large spreading tree; lvs. 2—5 ins. long, 1½—3 ins. broad, veins as in F. sycamorus" (21). At Toteng, Ngamiland. *Seiner* 205.

3. **F. ingens** Miq.

moumu (gen.)

Large, heavily branched tree. 'Livingstone's Tree' at Manyana, Kanye dist. is of this sp. though here called mothlatsa. *Hillary & Rob.* 569. *Miller* B/316, B/382, B/659.

4. **F. petersii** Warb.

At Nokaneng, Ngamiland. This sp. seems nr to no. 1. *Miller* B/432. *Pole Evans* 4081.

5. **F. pretoriae** Burtt Davy

mothlatsa (Ngwak.)

Tree 12 ft high nr Kanye. The 'Wonder Boom' of Pretoria is of this sp. *Miller* B/296.

6. **F. pygmaea** Welw.

On Botletle Riv. "Shrublet 1—3 ft high" (21). This seems to resemble no. 12. *Baines s. n.*

7. **F. smutsii** Verdoorn

Tree 20 ft high. Bark green-pink on peeling. 3 mis. S. of Topsi railway siding. *Miller* B/804.

8. **F. soldanella** Warb.

moomelantsweng (Ngwak.) mhawa (Tlhok.)

A climber on rocks. *Hillary & Rob.* 497. *Miller* B 233.

9. **F. sonderi** Miq.

Recorded by Burtt Davy in B.P. (4)

10. **F. sycamorus** L.

mochaba (G.N.P.)

Large tree of river banks in N.B.P. Lvs. light green, rough, broad as long. Bark yell. *Miller* B 443, B 1082. *Pole Evans* 4046. *Rob. & Elffers* 93. *van Son* H28949.

11. **F. verruculosa** Warb.

komoti, gomoti (G.N.P.) moumu (Mang.)

Tree 30 ft high at Sefare, Ngwato. Very common on rivers of the Okovango Delta where it forms pure, dense, low thickets stretching for hundreds of yards. *Miller* B/250, B/426. *Pole Evans* 4096, 4130.

12. **F. sp.**

mochaba (Taw.)

Shrub 3 ft high 25 mis. W. of Nokaneng, Ngamiland. Lvs. deeply lobed. Frts said to be well-tasting. Nr no. 6. *Miller* B/426.

13. **F. sp.**

Small tree 9 ft high on rocky ridge $2\frac{1}{2}$ mis. S.W. of Kabulabula. Not matched in Nat. Herb. *Miller* B/1031.

14. **F. sp.**

Large tree nr Kasane Rapids. Nr *F. capensis*, but frts glabrous. *Rob. & Elffers* 30.

URTICACEAE

POUZOLZIA Gaud.

1. **P. hypoleuca** Wedd.

ngwenyane (Kwena), mongololo (Kgat.)

Shrub 3 ft high. Flrs (Nov.) small, white. Lvs. nettle-like, white below. Wood brittle. *Hillary & Rob.* 502. *Miller* B/470, B/528. *van Son* H29033.

URERA Gaud.

1. **U. tenax** N.E.Br.

Tree Nettle. mmabi (G.S.P.)

Small tree 8 ft high in moist places. Stem & lvs. with ferocious stinging-hairs. A good fibre plant. At Pharing. *Hillary & Rob.* 464. *Miller* B/444.

PROTEACEAE

FAUREA Harv.

1. **F. saligna** Harv.

monyena (gen.) mofufu (Sub.)

Tree to 30 ft high. Flrs (Dec.—Jan.) cream coloured; raceme 9 cm. l. Lvs. altern., linear. Bark dark, rough. Wood fairly durable in ground, grain reticulated, makes waggon felloes. *Hillary & Rob.* 612. *Miller.*

PROTEA L.

Trees & shrubs, usually on poor acid soils subject to inundation.

1. **P. abyssinica** Willd.

Sugar Bush.

Tree to 13 ft high in 'malapos' of Tati & Chobe. *Miller* B/898, B/935.

SANTALACEAE

OSYRIS L.

1. **O. compressa** (Berg.) A. DC. (syn. O. abyssinica Hochst.)

African Sandalwood. kwaipi (Ngwak.) = to colour.

Shrub or small tree to 10 ft high. Flrs (July-Sept.) green. Bark yields tannin & dye. Lvs. simple, entire, altern., pale green. *Hillary & Rob.* 522. *Miller* B/312, B/640, B/663.

OLACACEAE

OLAX L.

Trees and shrubs with simple, altern. lvs.

1. **O. dissitiflora** Oliv.

Tree to 20 ft high & 8 ins. d.b.h. of moist places in N.B.P. Flrs (Oct.) white. Frt egg-shaped, red. *Miller* B/252, B/1102. *Pole Evans* 4054, 4139.

XIMENIA Plum.
Lax evergreen shrubs with edible plum-like frts which make a good jelly; a valuable oil expressed from the kernel. Brchlts spinose. Flrs white, glabrous without, bearded within. Common throughout B.P.

1. **X. americana** L. *var.* **microphylla** (Oliv.) Welw.
morotologana (gen.) mohambia (Kob.) morotologa (Taw.)
Flrs irregularly Apl to Nov. Frts Jan. Lvs. glabrous, shining. *Hillary & Rob.* 514. *Miller* B/15. *Pole Evans* 4136. *Rob. & Elffers* 80. *van Son* H28957.

2. **X. caffra** Sond.
morotologa (gen.) morotonoga (Taw.) moretologa kgomo (Mal.) mohambia (Kob.)
Lvs. larger than no. 1, tomentose. Flrs Sept.—Dec. Frts Nov.—Feby. *Hillary & Rob.* 521. *Mrs Lugard* 58. *Miller* B/34.

3. **X. rogersii** Burtt Davy
Hardly distinguishable from no. 1. *Mrs Lugard* 3.

LORANTHACEAE

Common shrubs parasitic on other woody plants, especially Acacia and Combretum. Frts are succulent and make a bird-lime.

LORANTHUS L.
palamela (gen.) ubulimbu (Kalaka)
Flrs often red, conspicuous. Lvs. simple, well developed. F.T.A. describes 215 African spp.

VISCUM L.
mistletoe. palamela (gen.)
About 50 African spp. Flrs minute, greenish. Lvs. usually reduced to scales, rarely foliaceous.

CHENOPODIACEAE

SALSOLA L.
1. **S. rabiena** Verdoorn
Saltwort.
Shrublet 3 ins. high. Lvs. very small, succulent. Flrs (Mch) straw-coloured. In lowest part of grass-covered pan of Kachwani nr Tsane, Kalahari. *Miller* B/1012.

SUAEDA Forsk.
1. **S. fruticosa** Forsk.
tuu (Sarwa) = night.

Plant of 2—3 ft high, of alkaline soils. Smells unpleasantly. Lvs. & bracteoles small, fleshy. Common on edge of Makarikari. *Miller* B/941. *van Son* H28927.

AMARANTACEAE

AERVA Forsk.

1. **A. leucrura** (L.) Moq.

togotsau (Taw.)

Plant of 2—3 ft high, often only semi-woody. Lvs. entire, altern., flat & appressed to stem. Flrs (Feb.) white, when dry used to stuff pillows. *Curson* 9, 496. *Miller* B/364. *Pole Evans* 4069. *van Son* H28744, H28945.

2. **A. tomentosa** Forsk.

"Stem suberect, 2—4 ft high; lvs. 4 ins. by 1 in.". F.T.A. Kwebe Hills. *Lugard* 180.

MARCELLIA Baill.

Inflor. of 2 fertile & 2 sterile flrs, latter reduced to bristles.

1. **M. bainesii** (Hook. f.) C. B. Clarke

"Perennial of about 18 ins. high. Flrs greenish-white" (2). Kwebe Hills. *Mrs Lugard* 158.

NYCTAGINACEAE

COMMICARPUS Standley

1. **C. plumbagineus** (Cav.) Standley (syn. Boerhaavia plumbagineus Cav.)

Climber with woody base. Flrs (Apl) white. Serondela & Kwebe Hills. *Lugard* 14, 41. *Miller* B/1028.

PHAEOPTILON Radlk.

1. **P. spinosum** Radlk.

Shrub with spinose brchlts. Lvs. linear, light green, verticilate. Frts winged as in *Combretum*. Goats are said to spare this plant. *Scholtz s.n.*

CAROPHYLLACEAE

POLLICHIA Soland

1. **P. campestris** Soland

moroto a piri (Kgat.)

Shrublet 18 ins. high at Mochudi. Flrs. (Jan.) small, with fleshy bracteole. Lvs. opp. or whorled. *Miller* B/406.

RANUNCULACEAE

CLEMATIS L.

Travellers' Joy. Old Man's Beard. mogau (gen.)

Climbers with woody base to stem which may be 3 cm. in diam.

Frts fluffy, dirty white. Flrs pale yell., conspicuous. As the native name indicates, the plants are regarded as poisonous.

1. **C. brachiata** Thb.

Flrs Apl. A plant of the N.B.P. *Lugard* 229. *Miller* B 1027. *van Son* H28990.

2. **C. oweniae** Harv.

Flrs Mch. A plant of the S.B.P. *Miller* B 569, B 837.

ANNONACEAE

ARTABOTRYS R.Br.

1. **A. sp.** nr *A. brachypetalata* Bth.

Tree with stem 13 ins. diam. with many lax, almost trailing branches. Lvs. simple, altern. Flrs (Oct) yell. with green calyx, set on a bent knee-like peduncle. At Kasane Rapids. *Miller* B 1080, B 1098. *Rob. & Elffers* 95.

POPOWIA Engl.

1. **P. obovata** Engl. & Diels

mochinga, mochingachinga (G.N.P.) mokondekonde (Mbuk.)

Shrub of the Baikiaea forest. Flrs (Jany) pale green, sepals 3. Frts (Apl) pink, fleshy, constricted over the seeds. Lvs. simple, altern. *Miller* B 5. B 107, B 1133. *van Son* H28766.

XYLOPIA L.

1. **X. antunesii** Engl. & Diels

Tree 20 ft high in Baikiaea forest. Flrs (Mch) with yell. petals, crimson stamens and yell. carpels. Lvs. simple with pale yell. midrib. Only one tree seen. *Miller* B 132.

CAPPARIDACEAE

1. **BOSCIA** Lam.

Trees or shrubs with simple, altern. lvs.

1. **B. albitrunca** Gilg. & Ben.

motlhopi (G.S.P.) motopi (Taw.) mongone (Kal.)

Tree to 35 ft high and 3 ft d.b.h., but usually much smaller. Bark whitish to grey-brown. Flrs (Aug.—Oct.) green-yell. Frts edible. Roots make a coffee substitute. Wood made into spoons, etc. A useful browse tree said to keep cattle alive when all grass has died off in S.W. Kalahari. Widespread. *Miller* B 13, B 669.

2. **B. corymbosa** Gilg

motupa (Sub.) mubite (Kol.)

Tree of N.B.P., much like no. 1. B 123 is a pubescent form. *Miller* B 22, B 123, B 638.

3. **B. foetida** Schinz

Found by Gerstner in S.W. Africa very near our border where it should be sought.

4. **B. hexamitocarpa** Ch. Gilg

Shrublet 2 ft 6 ins. high on bank of Simanwana stream on Maun—Francistown road. Flrs Oct. *Miller* B/951.

5. **B. kalachariensis** Pest

nimpipi

Small tree at Dowa Pan between Maun and Francistown. Much like no. 8. *q.v. Miller* B/152.

6. **B. matabeliensis** Pest

"distinguished by its broader, more ovate-lanceolate lvs. occurs just across our [i.e. Transvaal] border nr Tati." (4). This is the only record of its occurrence.

7. **B. macrophylla** Oliv.

"Evergreen tree of bushy nature; flrs green" (2) Kwebe Hills. *Mrs. Lugard* 27.

8. **B. rehmanniana** Pest

mopipi

Tree to 16 ft high. S. limit of range, N. part of Kanye dist. Flrs (Sept.) foul-smelling. Lvs. small, appressed to the branches. Wood used for carving. The tree is often left standing in fields. A gregarious, dwarf form about 6 ins. high in S. Kanye dist., called "motlhopi hatsi" may prove to be a new sp. (*Miller* 902.) *Miller* B/666. *van Son* H28815.

9. **B. tomentosa** Oliv.

"on 'Lake' River, Maun" (2) *Lugard* 18.

10. **B. sp.** cfr. B. salicifolia Oliv.

Pole Evans 4120, 4159.

CADABA Forsk.

Stamens and carpels borne on inch-long gynophore. Lvs. in whorls.

1. **C. juncea** (Sparrm.) Harv.

Flrs (Sept.) large, scarlet-yell. or purplish. Lvs. reduced almost to non-existence. Branches very thin, smooth, green, terete. *Miller* B/369, B/903.

2. **C. termitaria** N.E. Br.

Shrub 3 ft high. Gaberones & Ngamiland. *Hillary & Rob.* 562. *Mrs Lugard* 11. *Lugard* 2. *Miller* B/244, B/376. *Pole Evans* 4140.

CAPPARIS (Tourn.) L.

Shrubs, flrs usually large, apetalous, with many long staminal filaments.

1. **C. tomentosa** Lam.
motawana (Taw.) modyangwe (Mbuk.)

Evergreen rambling shrub of termite mounds. With support it can reach a height of 35 ft. Flrs (Sept.) white or pale yell., conspicuous. Frt brown, globose, 5—6 cm. diam. The spines, in prs, are probably modified stipules. The whole plant is tomentose. *Miller* B/42.

2. **C. sp.** cfr. C. oligantha Gilg & Ben.

A climber of Chobe dist. Flrs (Aug.) cream-coloured. *Miller* B/1087. *Rob. & Elffers* 108.

COURBONIA Brongn.

1. **C. camporum** Gilg & Benn. So identified, but may prove to be Maerua flagellaria *q. v. Miller* B/38.

MAERUA Forsk.

Lvs. simple except no. 5.

1. **M. angolensis** DC.

"Evergreen tree 6—20 ft high of Kwebe Hills" (2). Also in "temperate B. P. Flrs (Sept.—Oct.) white with pale yell. stamens" (4). *Lugard* 26. *Mrs Lugard* 28.

2. **M. crassifolia** Forsk.

"on a termite mound at Pilane" (4) *Burtt Davy* 20465.

3. **M. flagellaria** (Oliv.) Gilg & Benn.

Shrub 3 ft high of N.B.P. "Sepals and petals green, staminal filaments greenish white" (2). See Courbonia camporum. *Lugard* 135A. *Miller* B/38.

4. **M. legatii** Burtt Davy.

Lax shrub 2 ft high at Borehole no. 3, C.D.C. ranch, Chobe. Flrs (Sept.) white. Frts (Feb—Mch) legume-like, edible. *Miller* B/932.

5. **M. maschonica** Gilg.

Branchy climbing shrub of Chobe Riv. bank and in Mochudi village. Frts (Jan.) globose, edible. Lvs. simple or compound. Flrs (Oct.), anthers, sepals and outer side of petals green, pistil and stamens white. *Miller* B/526, B/668, B/874, B/949.

6. **M. schinzii** Pax.
moratlhetla, moratlhetle, moomani (S.P.).

Tree to 30 ft high. Flrs (Oct.—Dec.) white, showy. Frts (Dec.—Jany) legume-like, moniliform. Bark whitish, inner bark black; much used by native "doctors", purpose not known. Wood white, when dry shelling into concentric rings, ± 2 cm. wide. *Grant* 8. *Hillary & Rob.* 538. *Miller* B/230, B/328.

MYROTHAMNACEAE

MYROTHAMNUS Welw.

1. **M. flabellifolius** (Sond.) Welw.

Resurrection Plant. monnaokgang (G.S.P.).

Shrublet 2 ft high in shallow soil above sheet rock. Lvs. simple, fan-shaped, wrinkled. A dry, apparently dead stem, if placed in water will come into leaf within 36 hours. Flrs (Aug.) inconspicuous. *Hillary & Rob.* 545. *Miller* B/378.

ROSACEAE

PARINARI Aubl. Often misspelt "Parinarium".

Plant with simple lvs. grey below.

1. **P. capensis** Harv.

mmola (G.S.P.) mola hatshe (Taw.) mobola hatshe.

Shoots of a few inches high from a large, much branched underground stem. Frts 3—4 by 2 cm., grey-brown, make a native beer. Flrs (Nov.) small, yell. *Miller* B/356, B/709.

2. **P. mobola** Oliv.

mobola (G.N.P.).

Tree to 30 ft high. Lvs. and fruits much like no. 1. Occurs sparingly in N.B.P. *Miller.*

CONNARACEAE

BYRSOCARPUS Schum. & Thonn.

Shrubs with pinnate lvs., the lfts often so distant as to resemble lvs.

1. **B. orientalis** Baill.

monwana (Mang. & Kgat.)

4—8 ft high. Stem with occasional bristle hairs. Flrs Nov. Frts (June) small, globose. *Miller* B/23, B/79.

2. **B. tomentosus** Schellenbach.

Lax plant of moist places in N.B.P. Flrs (Oct.) white. Frts Nov.—Dec. *Miller* B/925B, B/1099, B 1116. *Rob. & Elffers* 53.

LEGUMINOSAE

Plants with pinnate lvs., except Baphia, and frt a pod (legume), except Pseudocadia. Subdivisions I Mimosaceae, II Caesalpineae, III Papilionaceae.

ABRUS L. III.

1. **A. precatorius** L.

Crab's Eye. mopiti (Taw.). mutenena (Mbuk.). and mophete.

Woody twiner with tendrilled brchlts. The pods, 2—3 cm. l. are twisted and contain many scarlet and black "lucky beans" much used for ornament. *Curson* 731. *Miller* B/1159. *Rogers* 6498.

ACACIA Willd. I.

The African spp. are all armed, thus distinguished from certain acacia-like Albizzias. The inflor. is either spicate or globose. These, with two exceptions, have respectively brown recurved spines and white straight spines, though a few spp. have globose inflor. with straight, but recurved spines at the ends of the brchlts. Lvs. are 2-pinnate. Flrs white to yell. are pollinated by both long and short-tongued insects. The genus provides edible gums, durable wood, cattle feed from pods and inferior cordage from bark.

1. **A. albida** Del.

Winter Thorn. munga (Kol.) kananga and mokosho (Mang.)

Tree to 60 ft high only found on alluvial soils. Flrs (June, Aug.) spicate, pale yell. Pods large, spirally twisted, shining, bright yell., seeds embedded in white spongy tissue and although greedily eaten by stock, are used in N. Rhodesia to stupify fish. Lvs. glaucous, pinnae 3—8 prs, lfts 9—15 prs, the apical prs usually broadest. Bark grey, corky, on the brchlts white with longitudinal lines of green. In mature trees the leafless period is during summer. A frost-tender sp., its S. limit of range is in Ngwato. *Miller* B/44, B3141. *Pole Evans* 4191. *Rob. & Elffers* 100. *van Son* H28897.

2. **A. amboensis** Schinz.

Flrs globose. "Lfts in 20 prs" (1). Gathered at Nata and in Ngamiland. May be conspecific with A. woodii, in which case the latter name falls away. *Curson* 106. *Pole Evans* 4087, 4121. *van Son* H28872, 28873, 28874.

3. **A. arabica** Willd. *var.* **kraussiana** Bth. (syn. A. benthamii Rochbr.) motshi (Mang.) moshu, mhure, mokga (Ngwak.) motabakgosi (Taw.) motsha (Kgat.) sinzi (Kol.) gu (Sarwa)

Tree about 10 ft high. Flrs (Oct.—Nov.) globose, deep orange coloured. Up to 8 peduncles springing from the same point. Lvs. with about 4 prs pinnae, lfts small, to about 20 prs. Pods to 22 cm. l., 1·5 cm. b., black, glabrous, moniliform, with wide margins (subalate), greedily eaten by cattle although containing much tannin. The sp. may be conspecific with A. subalata Vatke. *Hillary & Rob.* 530. *Lugard* 28. *Mrs Lugard* 30. *Miller* B/14, B/54, B/1073. *Rob. & Elffers* 70.

4. **A. arenaria** Schinz (syn. A. rufo-brunnea N. E. Br.).

Flrs globose, pale yell. "Involucel nr apex of peduncle. Pinnae

very numerous, up to 35-jugate; lfts in about 20 prs, linear-oblong, very small." (1) Botletle vall. The validity of this sp. doubtful. *Lugard* 245, type of A. rufo-brunnea N. E. Br.

5. **A. ataxacantha** DC. *var.* **australis** Burtt Davy (syn. A. eriadenia Bth.)
mokgwa (Kwena) mokona (Kol.) mokuku (Taw.) mogotau (Sub.)

Sprawling shrub or small tree of lax habit of N.B.P. Flrs spicate, yell. Spines scattered. Lvs. with or without prickles on midrib; lfts 20—40 prs. Bark yell.-brown. Probably the same as A. lugardae N. E. Br. *Curson* 584. *Mrs Lugard* 195. *Miller* B/182, B/425.

6. **A. burkei** Bth. (syn. A. mossambicensis Bolle)
mokgwa (Kwena & Ngwak.) mokoba (Mang. & Taw.) mokotokoto.

Tree to 45 ft high. Flrs (Oct.—Dec.) spicate, pale yell., which have withered before the new foliage appears. The recurved spines are often enlarged and remain on the larger branches. Lfts 3—4 prs, the apical pr usually largest. Pods flat, red to chocolate remaining on the tree over winter. Bark on young trees white, flaky, on old trees dark and rough. Brchlts often infested with round galls of $\frac{1}{2}$ in. diam. Not seen N. of Francistown. *Hillary & Rob.* 531. *Miller* B/272, B/371, B/492.

7. **A. caffra** (Thbg) Willd.
morutlhatana (Ngwak.) morutlhware (Kwena) morutlhari (Mal.) morutlhatshana (Ngwak.)

Tree to 25 ft high. Flrs (irregularly Aug. to Jany.) spicate, pale yell. to white. Pods thin, pointed both ends. Lvs. to 24 cm. l.; pinnae about 9 prs to 7 cm. l.; lfts about 10 prs; the rachis may have small recurved prickles on dorsal side. Some lvs. have a gland between base of lf-stalk and first pr of pinnae and 2 or 3 glands at bases of pinnae. *Hillary & Rob.* 529. *Miller* B/276, B/210, B/215.

var. **tomentosa** Burtt Davy.
monganakudu, *teste* Curson

Ngamiland. *Curson* 51, 55, 173.

8. **A. campylacantha** Schinz
White Thorn

Tree to 35 ft high. Flrs spicate, pale yell. Lvs. of 15—30 pinnae and 10—40 prs small lfts. Spines in prs on cushions. Bark grey. Matetsi vill., Chobe. *Miller* B/928.

9. **A. cinerea** Schinz (syn. A. fleckii Schinz)
mhahu (Sub.) mokoka (Kol.)

Tree to 30 ft high, sparsely distributed on eastern side of B.P. from N. to S. Material named A. cinerea, A. fleckii and A. mellei was compared

by Exell at Zürich with the types of the 2 first mentioned spp. He found these two conspecific and so the name A. fleckii falls away. According to White of I.F.I. A. cinerea "differs in several minor characteristics from A. mellei". Flrs (Dec.) pale yell. to white. Lvs. and lfts very small with minute prickles on rachis. Bark pale, rough, papery or flaky near base of bole, but not so white as A. dulcis, is straw coloured higher up the tree and smooth on branches. Brchlts grow from between prs of horny recurved spines. *Fleck* 412 colleeted at "Chansis", (? Ghansi), type. *Lugard* 93. *McCabe* 29. *Miller* B/11, B/14, B/16, B/81, B/445, B/499. (B/14 and B/16 were the material used by Exell). *van Son* H28871.

10. **A. detinens** Burch. (syn. A. ferox Bth.)
mongana (gen.) monka (Kgat.) monyaka (Kwena) moga (Kal.)

Small tree very occasionally to 20 ft high. Flrs (Aug.—Sept.) are between globose and spicate. Spines dark, recurved. Pods very thin, flat, about 35 mm. l. with few seeds, papery when dry (Nov.) Lvs. with 1, occasionally 2 prs of lfts which are ovate, 10 mm. l., 4—5 mm. b. Bark black or dark brown. Hab. clayey soils. *Hillary & Rob.* 535, 593. *Mrs Lugard* 13. *Miller* B/30, B/55, B/619. *Rob. & Elffers* 72.

11. **A. dulcis** Marl. & Engl. (syn. A. kwebensis N. E. Br.)
moloto (gen.) morengambo (Mbuk.)

Tree about 15 ft high. Flrs (Sept.—Oct. Feby.) spicate, pale yell. or white. Pods linear-oblong, 7 cm. l., 2·4 cm. b. (Apl.—June) dark red-brown, veins transverse from margin to margin. Spines in prs, sharp, recurved. Wood durable. Bark flaky, white. Lvs. 5 cm. l. with about 6 prs pinnae and 20 prs lfts which are contiguous. A gland on rachis $\frac{1}{2}$ way between base and first pr of pinnae, no prickles. S. limit of range latitude of Ootsi. *Mrs Lugard* 24, type of A. kwebensis. *Miller* B/546, B/667. *Pole Evans* 3190, 4019, 4117.

12. **A. erubescens** (Oliv.) Welw.

Shrub 4 ft high at Borehole no. 3, C.D.C. Ranch, Chobe. Collection notes missing. "Small tree. Spines short, recurved. Pinnae in 4—5 prs, lfts 10—14 prs. Flrs rose white, calyx grey-tomentose, petals pubescent outside" (1) The inflor. is spicate. *Miller* B/936.

13. **A. galpinii** Burtt Davy
mokala (gen.)

Tree to 60 ft high of river banks. Trees round Serowe kgotla are of this sp. Flrs very small set on a spike 6—9 cm. l. (Aug.) flr buds red-brown. Pods flat, about 20 cm. l, 3 cm. b. Lvs. with about 12 prs pinnae and 25 prs lfts. Bark pale. Young trees confusable with Albizzia rogersii, but latter unarmed. *Miller* B/278, B/877, B/1089. *Pole Evans* 4116.

14. **A. gerrardii** Bth.
moki (Mang.)

Small tree of "black turf", common nr Serowe. Flrs (Dec.) globose, white. Pods 4—5 cm. l., 1 cm. b. Lvs. with about 14 prs lfts 2·5 mm. l., 1 mm. b. (*Miller* B/1004 moka (Kal.)., mokwelekwele (Ngwak.) was gathered in the Kalahari 30 mis. west of Kanye, there very common. It was named A. gerrardi at Nat. Herb. and "Acacia sp." at Kew.) *Curson* 581. *Miller* B/202, B/1004.

15. **A. gillettiae** Burtt Davy
mokwelekwele (gen.) moka (Kal.)

Common tree in S.W. Kalahari, to 30 ft high. Flrs (Mch—Apl) globose, white with yell. anthers. Pods conspicuous in winter, chocolate-brown, as are also the brchlts. Spines mostly brown and recurved on young, but straight and white on old trees. *Miller* B/346, B/912, B/1152. (B/912 so determined at Kew. But for this, *Miller* B/1004, A. gerrardi would have been included here.) *Pole Evans* 4147.

16. **A. giraffae** Burch.
Camel Thorn. mogotho (Taw.), mokala (Ralong & Ngwak.), mogotlho (Kwena), mosu (Mbuk.).

Tree to 35 ft high. Flrs (Aug.—Sept.) globose, bright yell., fragrant. Frts large, woody, semi-lunate or boat-shaped with downy surface, seeds embedded in white pulp; a good cattle food. A form with terete crescent-shaped pods found in Ngamiland (*Miller* B/419). Spines long, white, often swollen by insect attack. Brchlts smooth, deep red, zig-zagging at each pair of spines. Bark brown-grey, thick, fibrous, somewhat reticulated, with occasional very narrow horizontal cracks. Not frost-tender, it is large and common on the Baralong farms. The roots are very foul smelling. *Hillary & Robertson* 605. *Miller* B/35, B/419, *van Son* H28869.

17. **A. goeringii** Schinz

Collected at Motlhatlogo, Ngamiland. Flrs globose. "Pinnae 8—12 prs, lfts up to 19 prs, linear-obtuse, about 3 mm. × 1 mm. Pod 2-seeded. straight, flat, obtuse and more or less constricted in the centre, 7 cm. × 17 mm." (1) *van Son* H28870.

18. **A. grandicornuta** Gerstner
moshaoka (general)

Branchy tree 12—15 ft high common near Mochudi and Ramoutsa. Flowers globose, pale yell. Pods somewhat falcate (less so than those of *A. karroo* which the tree resembles somewhat, but its bark is greyish, not black or dark brown). Branches often with round, $\frac{3}{4}$ inch diam. galls. *Miller* B/391, B/410.

20. **A. haematoxylon** Willd.
mokholo (*teste* Gerstner)

Collected by the late Father Gerstner "between Molopo and Nossop rivers". He describes it as "a graceful little desert tree, 6 inches in diameter and 20 ft high, apple-shaped, with bark like *Halleria lucida*, medium grey. At a superficial look pinnate, but the magnifying glass shows it twice pinnate. Inflorescences of yellow flower heads."

"Stipular spines, mostly long and straight. Lvs. with 3—19 prs of pinnae, short; lfts in 18—24 prs. Pod linear, falcate, incano-tomentose, seeds distant." (1) *Gerstner* 6274.

21. **A. hecatophylla** Steud.

"Tree with hoary-tomentose branches. Pinnae in 18—20 prs, lfts linear-oblong, obtuse, in 30—50 prs. Petals united about the middle, slightly exceeding the calyx. Pod oblong, firmly coriaceous, 3—7 seeded, 10—16 cm. × 2·3 cm." (1).

The flr is spicate. A tree of Abyssinia and Uganda. Its occurrence near Pilane railway station, the only record in the Protectorate, is peculiar. *Burtt Davy* 20462.

22. **A. hereroensis** Engl.

Collected in Ngamiland. "Lfts 20—25 jugate, very small. Prickles scattered; bark reddish-brown. Pod flat, narrow, linear, 8—10 cm. × 1·5 cm." (1). The flower is globose. *Curson* 487,582.

23. **A. karroo** Hayne (syn. A. horrida Harv.)
mooka, mookana (general) mokha (Kgal.) Gaba and butema (Kalaka)

Tree to 30 ft high, found largest on deep "black turf" soils. Flrs globose, bright yell., sweetly scented (Dec.—Feb.) but in Ngamiland seen in flower in March. Pods falcate, thin with distinct margins, 6—10 cm. × 5—8 mm. Bark black-brown or black in old trees. Young bark much used for cordage. Wood yell., not durable. Yields an edible gum formerly exported under name of "Gomme du Cap". Leaves with 1—3, rarely 4 prs pinnae and 6—15 prs lfts, 5—10 mm. l. *Curson* 467. *Miller* B/343.

24. **A. kirkii** Oliv.
ijwairi (Sub.) moralo (Taw.)

Tree to 20 ft high. The branches start low down on the trunk with which they form an acute angle. Flrs globose, yell., with a pink tinge (Nov.). Pods stipitate, linear-oblong, constricted between the seeds above each of which is a prominent tubercle. Bark smooth, shining, green-brown. Leaves 6 cm. l., pinnae about 12 prs, lfts very small, about 16 prs. Only found on ground subject to inundation, from Makari-

kari N. *Miller* B/116, B/896. *Pole Evans* 3152, 3317. *Robertson & Elffers* 54.

25. **A. litakunensis** Burch. (syn. A. heteracantha Burch. A. spirocarpoides Engl.)
mosu (Kwena & Taw.) moshu (Mang.), mosunyane (Kgat.)

A very common tree to 20 ft high. Flrs globose, small, pale yell. (Nov.—Jan.), sweet scented. Spines straight, white, shining except for a few at the end of each brchlt. which are short and recurved. Pods (March—June) spirally twisted, about 50—60 mm. l. measured along the spiral. Lvs. and lfts are small. The wood is useless.

Much resembles the larger *A. spirocarpa* but crown not mushroom-shaped and frts much smaller. *Curson* 270, 460, 770. *Mrs Lugard* 49. *Miller* B/70, B/506.

26. **A. lugardae** N. E. Br.

Collected by Mrs Lugard in the Kwebe Hills, Ngamiland. A tree to 15 ft high, "similar to *A. caffra* but is distinguished by the prickles on the leaves." (3). Brown continues that it has shorter and fewer seeded pods. [A. caffra frequently has prickles on the leaves. O.B.M.] "A close ally of *A. caffra* and very similar to *A. ataxacantha* DC var. *australis* Burtt Davy." *Mrs Lugard* 195, type.

27. **A. mellei** Verdoorn

Tree to 25 ft high. Pod flat, pointed, young pods densely gland-dotted. Lvs. with conspicuous stalked gland below lowest pr of pinnae, lfts small, contiguous. Flrs (Nov.) are spicate, pale yell. Close to *A. cinerea*. *Miller* B/499, B/597, B/575, B/718, B/950.

28. **A. nebrownii** Burtt Davy (syn. A. glandulifera (Schinz) Baker and A. rogersii B. Davy)
lerwana (Kgat.) See Verdoorn (24).

Tree 9 ft high. Flrs globose, canary-coloured. On Miller's specimens collected 16 miles N. of Kanyu on Maun-Francistown motor road and on farm Lovelswood, Tuli Block, the sessile glands on the leaves are wanting. *Mrs Lugard* 14, 16. *Miller* B/939 (Kew det.), B/372, B/491.

29. **A. nigrescens** Oliv. (syn. A. pallens Rolfe)
Knobby Thorn. Knobbybark. mokala (general) ungandu (Mbuk.) more o mabele (Mang.)

Common tree from Ngwato N., especially on edges of Okovango Delta. Flrs spicate, pale yell. (Aug.—Oct.). Pod flat, pointed (Feb.—March). Lvs. with 3 prs of pinnae, lfts in 1 or 2 prs about 10 mm. as broad as long, glaucous. Usually stem and branches studded with many enlarged knobthorns with layered, corky bases to 4 cm. in diameter,

sometimes touching each other and enclosing the whole stem. Wood heavy, hard, durable. *Lugard* 246. *Miller* B/317, B/435, B/894. *Pole Evans* 3181, 4085. *Robertson & Elffers* 64, 89.

30. **A. pennata** (L.) Willd.
mokukari (Mang.)

Bramble-like, sprawling shrub but sometimes climbing to 40 ft high, with globose, yell. or white flrs at ends of branches. Lvs. with many prs of lfts. with a nectary at base. A plant of moist soils in N.B.P. *Curson* 689. *Miller* B/256.

31. **A. rehmanniana** Schinz
mgaba (Kalaka)

A tree of the Tati dist. Flrs globose, white. Pods short with thin valves, blackish, distinctly nerved and with a slight longitudinal ridge in middle. Bark on branches smooth, red-brown, in contrast to the dark, rough, fibrous bark of the bole. *Miller* B/921. *Pole Evans* 3257.

32. **A. retinens** Sim
kangarangana (Mbuk.)

Small tree with yell. globose flrs. Pod veined, shining (but slightly hairy under lens). Leaves with 4—5 prs of pinnae and 10 prs lfts, very small and hairy under lens. *Miller* B/445. *Pole Evans* 3170.

33. **A. robusta** Burch.
moga (Kwena) moku (Ngwak.)

Tree 15—20 ft high. Flrs globose, white to pale yell. Pods s'raight, broad, veined. Brchlts swollen, with a few prs of recurved spines at their extremities; the other spines straight, long, white. Lvs. in 3s on spiky cushion between prs of spines. *Miller* B/409. *van Son* 28864.

34. **A. seyal** Del.

Collected on Botletle river near Lake Ngami. Flrs globose. "Tree up to 30 ft high with cinnamon coloured, powdery bark. Spines patent, slender or short and recurved. Pinnae usually 2—4 prs, lfts 8—20 prs. Flrs yell., corolla divided near the apex, not as far as the calyx. Pod linear, falcate, slightly constricted between the seeds," (1). *Pole Evans* 4093.

var. **multijuga** Schweinf.

Collected on Tati river. This variety differs from the type "in having more numerous pinnae, usually 8—10 pairs". *Pole Evans* 3251.

35. **A. spinosa** Marl. & Engl. (syn. A. rostrata Sim)

Differs from A. senegal in having pubescent peduncles and rostrate pods. Flrs spicate, white. Spines in 3s. Collected on Dikhatlong Ranch. Baker places this sp. under A. senegal. *Pole Evans* 3189.

36. **A. spirocarpa** Hochst.
moshu (general)

Tree to 40 ft high, the branches confined to the mushroom shaped crown. Common in Chobe and Maun. Only differs from *A. litakunensis* in its habit and much longer frts. Flrs (Nov.—Dec.) globose, small, pale yell., almost white. Lvs. small, to 30 mm. long; pinnae about 7 prs 10 mm. l. and 0·5 mm. b.; rachis and pinnae hairy. Spines recurved on brchlts, otherwise straight and white. Pods twisted, 5 mm. b. and 100 mm. l. measured along the twist, pubescent, parallel-veined. Roots foul smelling. *Miller* B/506, B/891, B/1127. *Robertson & Elffers* 71.

37. **A. stolonifera** Burch.
sitshi (Taw.) siki, setshe (Ngwak.)

Shrubs of slender, coppice-like, usually unbranched stems, about $2\frac{1}{2}$ ft high, growing from underground trunks. They grow gregariously forming low thickets several yards in diameter which, by arresting silt, become raised above the general level of the surrounding land. Flrs globose. Pod erect, woody, distinctly veined, about 10 cm. long and 2—2·5 cm. broad. Occurs throughout the B.P. but less common in the N. *Miller* B/660.

Acacia stolonifera Burch. var. **chobiensis** O. B. Miller var. nov.

A typo differt habitu et fructibus grandibus. Arbor robusta ad 5 m. alta, trunco inferiore ad 45 cm. diam., recto, sed ramis inferioribus saepe contactis terrae. (Planta tota formae semi-orbis circiter 5 m. diam.). Fructus circiter 13 cm. longus et 4·5 cm. latus, rectus, lignosus, venis distinctis. Semina circa 30, in funiculis longis 1·3 cm. Typus in herb. Kew. Miller B/1069.
sitshi (Taw.) mukona (Kol.) chiwonza (Sub.)

Tree occasionally 16 ft high and 18 ins. diam. below first fork which is usually low down and of which the branches may be 14 ins. in diam. It tends to form a semi-spherical mass, the lower part of which touches the ground. The inflor. (Aug.—Sept. and very sparingly in June) is fragrant, pale yell. and in all respects as in the typical form. The difference lies in habit and the much larger frts of the variety. These pods are to 13 cm. l. and 4·5 cm. b. with about 16 seeds on each valve borne on funicles about 1·3 cm. l. Lvs. hairy, about 4 cm. l. of 8—9 prs pinnae 18 mm. l. and 20 prs lfts about 3 mm. l. Bark of brchlts smooth, lenticular; bark of older wood rough, fibrous, dark. Roots foul smelling. Hab. banks of rivers. *Miller* B/1069, B/1107, B/418. *Rob. & Elffers* 44.

38. **A. uncinata** Engl.
mooku (Ralong)

Tree 30 ft high on main road west of Pilane-Molopo and thus some

yards outside the boundary of the Protectorate, where it is said to occur sparingly. Flrs globose. "Branches blackish. Pods 5—8 cm. l. and about 8 mm. b. Spines stipular, uncinate [= recurved]. Lfts in 6—7 prs, linear, obtuse" (1). In my specimen which was compared in the Nat. Herb. with authentic material, they are in about 20 prs. Gerstner considers this species conspecific with *A. retinens. Miller* B/523.

39. **A. woodii** Burtt Davy
morumasela (Sub.) morumasetlha (Taw.)

Large tree of the N.B.P. Flrs globose, yell., sweet smelling (Sept.—Nov.) Pods large, woody, dark yellow, exuding gum when punctured (May—June). Bark flaking, brown-yellow but bright yellow on ends of branches. Lvs. to 12 cm. l., pinnae about 20 prs, lfts 20—30 prs 4 mm. × 1 mm. The straight spines to 5 inches long. Wood fibrous, pale yell., heartwood not distinct. This species may prove to be conspecific with *A. amboensis* in which case the latter is the valid name. *Miller* B/50, B/71, B/428.

40. **A. xanthophloea** Benth.
Fever Tree. more o mosetlha (Taw. Mang.)

Tree to 20 ft. high with globose, yell., strongly scented flrs. Its powdery, cadaverous yellow bark is striking. An inhabitant of land subject to inundation. *Moore* s.n.

41. **A. sp.** = T. Honey 824 and J. Borle 1.
Ngamiland. *Curson* 548.

42. **A. sp.** cfr. A. macrothyrsa Harms.
Shrub 8 ft. high with yell. spicate inflor. It resembles A. galpinii except in stature and habitat. Locally abundant N. of Nata. The roots are said to have a foetid smell. *Miller* B/489.

43. **A. sp.**
Tree to 50 ft high on "black turf" between Kasane and Kazungula. Flrs (Nov.—Dec.) globose, white with pale yell. anthers. Lvs. 8—9 cm. l.; pinnae 4—6 prs 3 cm. l.; lfts 12—17 prs, 5 mm. l., 1 mm. b. Pod falcate, like that of A. karroo. Very close to A. usambarensis Taub, and matching other un-named specs. at Kew. *Miller* B/1081, B/1083, B/1125. *Rob. & Elffers* 98, 103, 104.

44. **A. sp.**
Not matched at Kew. Tree 18 ft high, between Matetsi vill. and Kazuma Pan, Chobe. Pod (Sept.) somewhat like that of A. grandicornuta. *Miller* B/930.

AFZELIA Smith III

1. **A. quanzensis** Welw.

Pod Mahogany. Afzelia (Standard Name). muwande (Taw. & Sub.) mukamba (Sarwa)

Large tree of N.B.P. Pod (Apl) 12—15 cm. l., 3—4 cm. b., woody, seeds black with scarlet aril, much used as ornament. Flrs Oct. Yields a good timber. *Miller* B/8, B/64.

ALBIZZIA Durazz. I

Unarmed trees or shrubs. Pods with thin valves, seeds on long funicles. In some spp. the lvs. are like those of the feathery-lv'd. acacias.

1. **A. anthelmintica** A. Brongn. *var.* **pubescens** Burtt Davy

monoga (gen.) uchundwe (Sub.)

Small tree to 16 ft. high. Flrs (Aug.—Oct.) precocious, white with green anthers, conspicuous. Bark blackish, young bark lenticular. S. limit of range from Artesia to Sekwane on Limpopo Riv. *Mrs Lugard* 15. *Miller* B/24, B/51. *van Son* H28883.

2. **A. antunesiana** Harms

Small tree with lvs. large for this genus. Only one tree seen, at Komani on Ngwezumba str., Chobe. *Miller* B/188.

3. **A. harveyi** Fourn. (syn. A. hypoleuca Oliv.)

molalakgakga (G.N.P.) = resting place of guineafowl.

This and no. 5 are much alike in their feathery lvs. Pod to 13 cm. l., 3 cm. b. *McCabe* collected the type in Ngamiland. *Curson* 25, 84. *Mrs Lugard* 32. *Miller* B/258, B/413. *Pole Evans* 4089, 4101.

4. **A. rhodesica** Burtt Davy

sipumbula ma tako (Sub.)

Tree to 30 ft high. Bark peels off in broad, thin, paper-like sheets. Inflor. (Sept.—Oct.) white with green tinge. Wood light, coarse grained, dirty white. *Miller* B/53, B/135.

5. **A. rogersii** Burtt Davy

mmola (Mang.) molalakgakga (Taw.)

Tree to 35 ft high. Flrs (Oct.—Nov.) creamy white. Chobe and Tati. *Grant* 9. *Miller* B/1100.

6. **A. struthiofolia** Milne-Redhead

mmola, molalakgakga (G.N.P.) moarungarunga (Mbuk.)

Tree of Ngamiland & Chobe. Much like no. 3. *Miller* B/69, B/197.

7. **A. versicolor** Welw.

mokobongo and motshwarakgane (Taw.) linko (Sub.) mokongotshi (Mbuk. kakomo (Kob.)

Tree to 35 ft high of Chobe & Ngamiland. Flrs (Oct.) white with green tinge. Wood used for furniture and bark for soap. *Miller* B/56, B/335.

AMBLYGONOCARPUS Harms I

1. **A. obtusangulus** Harms

Scotsman's Rattle. mbaimbai (G.N.P.)

Large tree yielding useful timber. Pod glossy, 4-sided, woody, chestnut brown. The dried fruit rattles. Flrs (Oct.) racemose. Lfts ovate. There is a fine specimen on Victoria Falls railway station. *Miller* B/581. *van Son* H28884.

BAIKIAEA Benth. II

1. **B. plurijuga** Harms

Rhodesian Teak, the Standard, but unfortunate name. Zambesi Redwood. mokusi (G.N.P.) ukusi (Mbuk.)

Tree with dark foliage. Flrs (Dec.—Mch) conspicuous, erect, magenta. Pod woody, erect, velvety, opening explosively. Bark rough, red-brown on old; smooth, blue-grey on young wood. The most important of our timber trees; yields sleepers, parquet, etc. Only found on Kalahari sand. *Curson*. *Miller* B/1, B/2. *Pole Evans* 4162. *Rob. & Elffers* 63.

BAPHIA Afzel III

1. **B. obovata** Schinz

isunde (gen.) sentsho (*teste* Curson).

Bushy shrub of Baikiaea forest, 4 ft high. Lvs. simple, altern. Flrs (Nov.) white with yell. dot at base of standard. Pod woody, twisted on drying. *Curson* 176. *Miller* B/7, B/59, B/75. *Pole Evans* 4072, 4165. *van Son* H28885.

BAUHINIA Plum. II

Trees and shrubs with lvs. which are either deeply lobed or of 1 pr of lfts connate at base.

1. **B. fassogiensis** Klotz. (syn. B. bainesii Schinz)
Woody climber with yell. flrs. *Baines* at Lehututu, Kalahari.

2. **B. macracantha** Oliv.

mupondopondo (G.N.P.) motwakidja (Kwena) mochope (Mbuk.) mokoshi (Ngwak.) motsope (Sub.) motshanja (Mang.)

Common shrub in Baikiaea forest, occurring sparingly and very locally in S.B.P. The type was collected nr Lake Ngami by *McCabe*. Flrs (Sept.—Nov. and Feb.—Mch) large, white with pale yell. anthers. Some plants have tendrilled brchlts. *Curson* 185, 211. *Erens* 222, 364.

Lugard 144. *Mrs Lugard* 189. *Miller* B/74. *Pole Evans* 4023, 4166. *Rogers* 6876. *van Son* H28887, H28890.

3. **B. urbaniana** Schinz
mupondopondo (G.N.P.) mo'shanja (Taw.)

Shrub 3 ft high in Baikiaea forest. Much like no. 2 but flrs (June) smaller and may be white, pale or deep pink on same plant. *Miller* B/421, B/1032.

BOLUSANTHUS Harms III

1. **B. speciosus** Harms
S. African Wisteria. nsukungaphala (Mang.) nsungamola (Kalaka) motsokophala (Mang.)

The only sp. Small tree with handsome racemose, violet coloured inflor. (Sept.) Lvs. pinnate, lfts widely spaced, sharply pointed. Frts finely reticulate over seeds. Common in Tati, occasional in Chobe. *Grant* 2. *Miller* B/920.

BRACHYSTEGIA Bth. II

A difficult genus in which much confusion exists.

1. **B. boehmii** Taub. (syn. B. filiformis Hutch. & B. Davy)
muvombo

Tree to 40 ft high in Baikiaea forest. Found also by van Son at Nkate, Makarikari. Lfts contiguous, linear ± 25 mm. l. *Miller* B/145. *van Son* H28878.

2. **B. sp.**

Collected west of Kachekau. *Pole Evans.* 4637.

3. **B. sp.**

Collected in Ngamiland, without precise locality. *Curson* 364.

BURKEA Bth. II

1. **B. africana** Hook.
monato (G.S.P.) mosheshe (Taw.) mkalati (Kal.)

The only sp. Common tree to 30 ft high and 20 ins. d.b.h. Flrs (Oct.) pale yell. on spike to 8 ins. l. Pods (Feb. onwards) thin, 1—2 seeded. Brchlts swollen, with red tomentum. A useful wood for felloes, parquet, etc. Hab. sandy soils. *Hillary & Rob.* 498. *Miller* B/77.

CASSIA L. II

Most spp. are herbs.

1. **C. abbreviata** Oliv. *var.* **granitica** Baker f.
mokwankusha and sifonkola (Kol.) monepenepe (Mang.) nshashanyana and nlembelembe (Kalanga, *teste* Matthews)

Tree 20 ft high. Flrs (Sept.) bright yell., precocious. Pod narrow, cylindrical, over a foot long. E. Chobe, Ngwato and Tati dists. *Miller* B/39, B/125. *Rob. & Elffers* 90.

COLOPHOSPERMA Kirk II

1. **C. mopane** (Kirk) J. Leonard (syn. Copaifera mopane Kirk)
mophane (gen.)

Tree to 30 ft high. Frts flat, thin, nautilus-like in outline. Lvs. of 1 pr of lfts, dark. Wood hard, heavy, resinous, durable, makes a good mining prop and fair charcoal. S. limit of range 16 mis. N. of Mahalapye. Gregarious, on stiff soils. Large areas have been reduced to coppice by fire and continually cut back by frosts. Some trees yield a good fibre from the bark while others quite useless for this. *Curson* 28. *Lugard* 243. *Mrs Lugard* 296. *Mally* s. n. *Marloth* 3326. *Miller* B/113. *Pole Evans* 3219, 4003.

CROTALARIA L.

Pods inflated. Flrs racemose. Lvs. 3-foliolate.

1. **C. lotoides** Bth.

Woody plant 9 ins. high. Flrs (Jany) yell. Frts Jany. Pharing. *Miller* B/831, B/832.

2. **C. polysepala** Harr.

Woody plant 2—3 ft high. Flrs (June) bright yell. Frts 10cm. l., hairy. *Miller* B/1052.

DALBERGIA L. III

1. **D. melanoxylon** Guill. & Perr.

African Blackwood (Standard Name). mokelete (G.N.P.)

Small tree, seldom large enough for timber, which is black with bright yell. sapwood. Lvs. pinnate, the lfts small and widely spaced. Brchlts spinose. Flrs (Dec.) white. *Miller* B/886, B/1132. *Pole Evans* 3238.

DIALIUM L. II

1. **D. simii** Phillips

mohamani (G.N.P.), usimba (Mbuk.)

Tree of 20 ft high of Baikiaea forest. Lvs. pinnate. Frt. 1-seeded. *Miller* B/645.

DICHROSTACHYS Wight & Arn. I

Shrubs or small trees. Acacia-like, but spineless, the brchlts being spinose.

1 **D. arborea** N.E. Br.

Tree 10 ft high of Ngamiland. Lvs. shorter than in nos. 1 and 2. *Curson* 230. *Holub*. *Lugard* 27 type.

2. **D. glomerata** Hutch. & Dalz. (syn. D. lugardae N. E. Br. & D. nutans Bth.)

moselesele (gen.) keye (Sub.)

To 12 ft high. Lvs. altern., lfts small, feathery. Flrs (Dec.—Feby.) conspicuous with pink stamens and mauve, turning white, staminodes. Frts twisted, bunched. Sir Harold Glover in *Empire Forestry Review*, Vol. 30, no. 3, writing of Cuba, says "many of the pastures have been overgrazed and this has been followed by the invasion of the marabou thorn (*Dichrostachys nutans*) an African species, which forms impenetrable thickets. It is spread by cattle voiding the seeds, and in 1945 was calculated to have covered 919,000 acres of agricultural and pastoral land. Research in insecticides, etc., has failed to discover anything which destroys it." Though in the B.P. it forms thickets, they are seldom impenetrable or of great size. *Lugard* 42. *Mrs Lugard* 78. *Hillary & Rob*. 532. *McCabe*. *Miller* B/87, B/789, B/790. *Rob & Elffers* 86. *van Son* H28862.

ELEPHANTORRHIZA Bth. I

1. **E. burkei** Bth.

mositsane (gen.) namba (Sarwa)

Tree 8 ft high. Pod about 18 cm. l. (one was measured 28 cm. l.) distinctly margined, thin; seeds closely packed with flattened ends. Flrs (Sept.) spicate, white turning yell. Bark black. Plant is sometimes completely defoliated by caterpillars of a Pyrolid moth. *Miller* B/221, B/562.

2. **E. elephantina** Skeels

mositsane (gen.)

Lvs. and yell. racemose inflor. borne on brchlts 5 ins. long emerging from an underground stem said to reach 30 ft long, yielding a good tannin. Flrs, Sept. *Miller* B/482, B/517.

3. **E. sp.** cfr E. fruticosa Schinz (Kew dć .)

namba (Sarwa)

Shrub 3 ft high nr Matetsi vill., Chobe. Flrs (Sept.) precocious, yell. *Miller* B/925A.

ENTADA Adans. I

1. **E. nana** var. **pubescens** R. E. Fries

Low shrub of Baikiaea forest. Pods very broad. Flrs in slender spikes. Lvs. like those of Burkea africana. *Miller* B/185.

ERYTHRINA L. II
Trees with 3-foliolate lvs. Pods moniliform.

1. **E. caffra** Thbg
Coral Tree. Kaffir Boom. mophete (G.S.P.)
Small tree with large coral coloured flrs, irreg. July—Oct. Seeds are small red "lucky" beans. *Hillary & Rob.* 570. *Miller* B/662.

2. **E. sp.** nr E. latissima E. Mey & E. gibbsae Bak. f.
mofhupe, mophete *teste* Ellenburger. monabete *teste* Grant.
Tree over 20 ft high and over 4 ft diam. Branches densely covered with spines. Flrs (Oct.—Nov.) dull crimson. Pod with 1—2 seeds, deeply constricted, thick, woody. Spec. is being examined at Kew and may be a new sp. Only 1 adult and 4 young trees known. These are 4 mis. from Mswazi's old kraal in Bakalaka country, E. Ngwato dist. *Delorme* H584, H828. *Ellenberger* H512.

ERYTHROPHLOEUM Afzel II
1. **E. africanum** (Welw.) Harms
mobako (Taw.) ununza (Sub.) mupombo and mukonkotsi (Mbuk.)
Small tree of Baikiaea forest. Lvs. pinnate, altern. Pod flat, coriaceous. *Erens* 415. *Miller. Pole Evans* 4208, 4625, 2768.

GUIBOURTIA (J. J. Benn.) J. Leonard
1. **G. coleosperma** (Bth.) J. Leonard (syn. Copaifera coleospermum Bth.) Rhodesian Copalwood (Standard Name) motsaudi, munzauri (Kol.) tsaudi (Taw.) nsibi (Sub.) oshi (Mbuk.)
Tree to 35 ft high. Frts pulpy, edible. Lvs. with 1 pr lfts. Yields a handsome timber, fragrant when freshly cut. *Erens* 425. *Lugard* 244. *Miller. Pole Evans* 4612.

HOFFMANSEGGIA Cav. II
1. **H. rubra** Engl.
"Thorny bush 5 ft high; flrs pink" (2) at Tklane Pits, Kalahari. *Lugard* 305.

INDIGOFERA L. III
Shrubs, shrublets and herbs clothed with appressed hairs fixed at the middle. Here with usually pinnately compound lvs. and red flrs. Frts sessile, transversely chambered.

1. **I. circinnata** Bth.
Recorded in B.P. (4). Usually with numerous spines. Pod curved in a complete circle.

2. **I. comosa** N. E. Br.
Pods 10—13 cm. l., dark brown, constricted over the seeds. Pharing. *Miller* B/548.

3. **I. cryptantha** (Harv.) Bth.
Shrublet 18 ins. high. Flrs Nov. Pharing. *Miller* B/784.

4. **I. daleoides** Bth.
Recorded from B.P. (4).

5. **I. flavicans** Bek.
The type was collected by Baines. 3-foliolate. *Holub* 1098. *Lugard* 146. *Mrs Lugard* 190. *Pole Evans* 4082, 4127. *van Son* H28906.

6. **I. macra** E. Mey.
Recorded from B.P. (4). 5—11 lfts.

7. **I. melanadenia** Bth.
morobe omtuna and mopanya (Ngwak.) *Miller* B/976.

8. **I. variabilis** N. E. Br.
Branches white. Lfts 1—5. Type gathered in the Kwebe Hills. *Hillary & Rob.* 540. *Lugard* 99. *Mrs Lugard* 119.

9. **I. sp.** = *Codd* 724. *Acocks* 12364.
Shrublet 18 ins. high. Flrs Apl. Pharing. *Miller* B/1021.

ISOBERLINIA Craib & Stapf
1. **I. globiflora** (Bth.) Hutch. ex Greenway
mutondo.
Tree 30 ft high in N.E. corner of B.P. Pod woody, tomentose, square at apex, with sharp beak. Lvs. of 5—6 prs lfts, widely spaced. Flrs (Aug.—Sept. and Jany.) pale yell, globose. Bark of roots used to make fish nets. *Miller* B/144.

LONCHOCARPUS H.B. & K.
Trees with lax, paniculate inflor.

1. **L. capassa** Rolfe
Rain Tree. mopororo (Taw.) mopanda (Kol.) mukololo (Sub.) upanda (Mbuk.) mohata (Mang)
Tree to 40 ft high. Flrs (Sept.—Dec.) violet coloured on lax raceme. Lvs. large with 3—5 lfts to 10 cm. long. Pods thin, tapering at both ends about 7 cm. l. remaining for several months on tree. Bark whitish. Tree used for grain mortars and dugout canoes, Maun. It is somewhat frost-tender and does not occur S. of Ngwato dist. The tree is sometimes attacked by a sucking bug, hence its English name. *Curson* 166. *Miller* B/49. *Pole Evans* 4034. *Rob. & Elffers* 114. *van Son* H28891.

2. **L. nelsii** (Schinz) Heering & Grimme
Appleleaf Tree. mopanda (Kol.) mmhara (Mang.) mwahata (Taw.) mukololo (Sub.)

A smaller tree than no. 1 with a shorter S. range. Flrs (Sept.) pink to purple, paniculate. Lvs. simple, apple tree-like. Bark flaky, yell. Wood makes good axe handles. Frts Oct. *Miller* B/47, B/57, B/90. *van Son* H28903.

3. **L. laxiflorus** Guill. & Perr.

Collected on the Old Hunters' Road. A tree of Nileland and Upper Guinea. *Pole Evans* 3328.

MIMOSA L. I
1. **M. pigra.** L. (syn. M. asperata L.)
Sensitive Plant. pilubutuku (Taw.) mongywani (Kol.)

Thorny, lax shrub to 10 ft high, of river banks in N.B.P. Flrs (Sept.—Oct.) capitate, pinkish. Frts opening transversely between the seeds, bristly. Lf with prickles at base of each pr of pinnae and between each pr. *Curson* 52, 709, 734. *Miller* B/885, B/1105.

MUNDULEA Bth. III
1. **M. sericea** A. Chev. (hom. M. sericea Greenway. syn. M. suberosa (DC.) Bth.)
mositlha ba tau (Mal.)

Shrub about 2½ ft high, in S.B.P. usually found on shallow soil above shale. Lvs pinnate with sharply pointed lfts, grey-white below. Flowers irregularly. Inflor. racemose, lilac-coloured, showy. In Ngwato dist. it is often a small tree 10 ft high and confused with Bolusanthus. Bark corky. *Hillary & Rob.* 555. *Lugard* 73, 302. *McCabe* 2, 43. *Miller* B/156.

ORMOCARPUM Beauv. III
1. **O. trichocarpum** Taub.

At Tantebane, Tati. "Flrs blue, large, solitary or in prs. Lfts 11—17, very small" (2). *Pole Evans* 3235.

OSTRYODERRIS Dunn III
1. **O. stuhlmannii** (Taub) Dunn
muzwamalowa (Sub.) muzamalowa (Kol.) mufamalowa.

Tree to 30 ft high and 20 ins. d.b.h. Bark rough, flaky, exuding a red juice when cut. Frt indehiscent with winged margin. Flrs (Oct.) white. Chobe & Tati dists. *Miller* B/1103. *van Son* H28886.

PARKINSONIA L. II
1. **P. africana** Sond.

Shrub collected on our border by Gerstner near Rietfontein and

should be sought in B.P. "Flrs yell., petiole very short and ending in a spine. Main axis of lf very long, flattened, lf-like; lfts very small." (20)

PELTOPHORUM Vogel II

1. **P. africanum** Sond.

mosetlha (gen.) mosiru (Sub.) movevi (Mbuk.) nzeze (Kalaka)

The only sp. Tree to 35 ft high. Flrs (Nov.—Jany.) yell., conspicuous. Pods flat, pointed, 2-seeded, much liked by cattle and remain long on the tree. Said to yield a good turner's wood. *Curson* 121, 198. *Erens* 292. *Galpin* 7009. *Hillary & Rob.* 528. *Lugard* 241. *Miller* B/85, B/117.

PILIOSTIGMA Hochst. II

1. **P. thonningii** (Schum.) Milne-Redhead (syn. Bauhinia thonningii. Schum. Bauhinia reticulata Oliv.)

mutukutu (Sub.) musekese and mubaba (Kol.) mupapama (Mbuk.) nsekese (Kalaka.).

Tree of Chobe & Ngamiland. Flrs (Dec.—Jany.) white to pinkish. Pod 12—18 cm. l., 5—6 cm. b., woody. Lvs simple, coriaceous, with the appearance of 2 lfts. *Curson* 1018. *Miller* B 1289. *Pole Evans* 3329.

PSEUDOCADIA Harms III

1. **P. zambesiaca** (Baker) Harms

motha (Mang.)

Large, shady, evergreen tree of moist places from Sefare and Selika to Limpopo Riv. Flrs (Oct.) inconspicuous, greyish, racemose, strongly & pleasantly scented. Frts smooth, blue-grey, shining, somewhat globose with a distinct groove on one side. Wood hard, heavy, handsome. *Miller* B/465.

PTEROCARPUS L. III

Trees or shrubs with yell. flrs, winged frts and pinnate lvs.

1. **P. angolensis** DC.

Muninga (Standard Name) Bloodwood. mukwa, mokwa (G.N.P.) mulombe (Sub.) moowa (Mbuk.) morotomadi (Mang. *teste* Delorme)

A fine tree to 35 ft high and 24 ins. d.b.h. Bark, very thick, when cut exuding a red juice. Flrs (Oct.—Nov.) precocious. Frts with large circular winged margin ± 6 cm. diam., with a bristly boss over the seed. A fine furniture wood which gives a good peeler veneer. Not found south of Ngwato & Tati. *Curson* 975. *Miller* B/1157.

2. **P. martinii** Dunkley

modianzovu (G.N.P.)

Small tree or shrub of Baikiaea forest. Flrs Aug.—Sept. Sap- and heart-wood pale straw coloured. *Miller* B/146, B/148. *Pole Evans* 4156.

3. **P. rotundifolius** (Sond.) Druce (syn. P. sericeus Bth.)
mpanda (Kalaka)

"Tree 15—20 ft high; flrs orange-yell., sweetly scented". (4). Ngamiland & Tati. *Curson* 91. *Miller* B/1288. *Pole Evans*.

4. **P. stevensonii** Burtt Davy
moangola (Kol.)

Small much branched tree only seen at Kazungula and Sidudu, dist. Chobe, on shallow soil over limestone. Wood light yell., making excellent waggon wheel felloes and axe handles. Frt as broad as long. 3 cm., flat. *Miller* B/138, B/322, B/325.

SCHOTIA Jacq. II
Boer Bean
1. **S. transvaalensis** Rolfe

Large tree on banks of Limpopo Riv. from Martin's Drift north. Wood useful. Midrib of the pinnate lf is winged. Flrs not seen but probably deep red. *Miller* B/368.

SESBANIA Scop. III
Plants of moist soils.

1. **S. aegyptiaca** Poir
linyeli (Taw.)

Slender shrub to 11 ft high. Pod thin, terete, often twisted. Flrs (July) yell., streaked brown. Lvs. to 25 cm. l., lfts 2 cm. l. *Miller* B/884, B/1062. *Pole Evans* 4169.

SWARTZIA Schreb. III
1. **S. madagascariensis** Desv.
moshakashela (Mbuk.)

Small tree of Baikiaea forest, Sitengu Pan and near Mohembu. Bark pale, stringy; this and the roots used medicinally on dogs and humans. Pod somewhat constricted over the seeds and like a long thin, black sausage. Lvs. of about 4 prs pinnae used to poison the bilharzia-carrying snail. *Miller* B/422.

TEPHROSIA Pers. III
1. **T. burchellii** Burtt Davy

Shrublet 2 ft high, among rocks. Flrs (Jany) red to purple. Pod 3-seeded. *Miller* B/979.

2. **T. contorta** N. E. Br.
Lugard 132.

3. **T. polystachyoides** Bak. f.
Shrublet among rocks, Pharing. Flrs (Nov.) magenta. *Hillary & Rob.* 614. *Miller* B/782.

ERYTHROXYLACEAE

ERYTHROXYLUM P. Browne
nganganga
1. **E. sp.** (? sp. nov.)
Not matched at Kew or Nat. Herb. Tree 25 ft high with lax branches. Foliage sparse. Lvs. simple, light green, somewhat spatulate. Flrs (Dec.) inconspicuous. Frts (Apl.) small, pulpy. Kasane and Serondela. *Miller* B/825.

ZYGOPHYLLACEAE

BALANITES Del.
1. **B. aegyptiaca** Del. *var.* **angolensis** Welw.
Shrub in Mopane forest 80 miles N.E. of Maun. Brchlts spinose. Frts crimson, pulpy, 28 mm. l. Lvs. of 2 lfts. "Living" bark, peeling green, smooth. *Miller* B/417.

RUTACEAE

HESPERETHUSA M. Roem
1. **H. villosa** Janaka (at present only an ms. name)
sapolanaga (Taw.) nzani (Sub.)
Many stemmed tree to 16 ft high. Flrs (Nov.) pale yell. Lvs. soft, slightly hairy with 3—4 prs lfts with clavate wing between each pr, densely dotted with oil glands. Brchlts sharply spinose in prs above each lf. Bark on young wood, densely hairy; otherwise glabrous, black. Much used when available, as a hut pole. *Miller* B/1063, B/1110. *van Son* H28984.

SIMARUBACEAE

KIRKIA Oliv.
1. **K. acuminata** Oliv.
muzumina (Taw.) ivomena (Sub.) modumela (Mang.)
Tree to 40 ft high and 25 ins. d.b.h. with grey bark. Inflor. umbellate, with pale yell. or white flrs (Oct.—Nov.) Prop gates easily from truncheon cuttings. Wood has lately been found to give a useful peeler veneer. *Curson* 113,431. *Miller* B/66, B/1108. *Pole Evans* 2590.

BURSERACEAE

COMMIPHORA Jacq.

Trees and shrubs with, generally, compound lvs. which fall early. The bark of many spp. is soft, peeling green and exudes resin or myrrh. Most spp. strike readily from large cuttings. The genus requires revision.

1. **C. betchuanica** Engl.

seroka and moroka.

Small tree in thorn scrub on Zambesi Riv. *Miller* B/62.

2. **C. edulis** Engl.

moroka, mokomoto.

Tree 40 ft high. Juice milky. Bark whitish. Lvs. pinnate, often variegated green and yell. Flrs (Oct.—Nov.) on raceme 13 cm. l. yell.—green. Frts. reddish, elliptical, edible (Jany.) *Miller* B/318, B/1193, B/1281.

3. **C. fischeri** Engl.

moroka (G.N.P.)

Small tree to 15 ft high or as undershrub in Baikiaea forest. Lvs. 3-foliolate. Bark red-brown peeling green. Frts Apl. *Miller* B/4, B/12. *Pole Evans* 3233.

4. **C. glandulosa** Schinz

Tree 12 ft high, 10 ins. d.b.h. Flrs (Nov.) dull crimson. Lvs. simple, serrate. Brchlts ± spinose. Bark grey, smooth, not peeling, exuding a grey-pink gum when punctured. Serondela. *Miller* B/1118.

5. **C. kwebensis** N. E. Br.

"Spineless, much branched shrub or small tree, 4—15 ft high. Lvs. 3-foliolate or pinnately 3-foliolate. Flrs (Dec.) precocious. Frts Feb." (2). *Lugard* 86 type? *Mrs Lugard* 34 type?

6. **C. lugardae** N. E. Br.

"Thorny tree to 10 ft high; Flrs precocious. Exudes quantities of pink and white gum standing out in knobby balls. Brchlts ending in spines. Lvs. simple or 3-foliolate. Drupe globose, red when ripe". (2) Kwebe Hills. *Mrs Lugard* 23 type.

7. **C. marlothii** Engl.

mopapama (Mang.)

Tree 20 ft high. Bark peels in paper-like strips. 3 mls. S. of Topsi Siding. *Miller* B/802.

8. **C. mollis** Engl.

Ngamiland. *Curson* 117, 792.

9. **C. pyracantha** Engl.

The common sp. of eastern S.B.P. Lvs. simple, much serrated. Brchlts spinose. Bark green, smooth. *Miller* B/62, B/63.

10. **C. stolzii** Engl.
Ngamiland. *Curson* 120.

11. **C. welwitschii** Engl.
18 mis. N. of Mahalapye. *Pole Evans* 3202.

12. **C. sp.**
Allied to C. edulis. Tree 40 ft high. Lvs. variegated green and yell. Frts (Jany) red. Kazungula. *Miller* B/318.

13. **C. sp.** near C. harveyi Engl.
Small tree on Zambesi Riv. Flrs (Oct.) red. Bark green. *Miller* B/63.

14. **C. sp.** Near C. stolzii.
mhota. moisatuma (Taw.)
Tree 40 ft high, 38 ins. d.b.h. Lvs. compound, some variegated green and yell. Bark flaky, not peeling. Kasane and Sefare. *Miller* B/261.

15. **C. sp.**
moroka
Shrub 3 ft high near Borehole no. 3, C.D.C. ranch, Chobe. Flrs (Sept.) crimson. *Miller* B/931.

MELIACEAE

ENTANDROPHRAGMA C. DC.
1. **E. caudatum** Sprague
mopumena (G.N.P.) motlhokomoti (Tati dist.)
Large timber tree of Baikiaea forest and Tati dist. A true African mahogany. Lvs. pinnate, the lfts with yell. central axis. Inflor. (Sept.) precocious, green, racemose. Frts cigar-shaped, ± 8 cm. l. with winged seeds. Bark exfoliates in plate-like pieces. *Miller* B/1156. *Pole Evans* 3250. *van Son* H28967.

MELIA L.
1. **M. azedarach** L.
Bead Tree. S. African Syringa. morulana (Kwena) morulwana (Ngwak.) mosalaosi (Mal. & Kgat.)
A common introduced tree. Flrs lilac-coloured. Frts globose, said to be poisonous to cattle.

PTAEROXYLON E. & Z.
1. **P. obliquum** (Thbg) Radlk. (syn. P. utile E. & Z.)
Sneezewood. tati ? (The Zulu name is um-tati and this name may have been bestowed on Tati dist. when invaded by the Matabele impis when, surprisingly, they found the tree so far from their native Zululand.)

Here a small tree seldom large enough for fence poles for which it is commonly used, being very decay resistant. It is however, owing to its essential oil, very inflammable. Lvs. pinnate, strong smelling when bruised. Seeds winged. Tantabani Farm, Tati. *Miller* B/607. *Pole Evans* 3264, 3237.

TRICHILIA L.

1. **T. emetica** Vahl (syn. T. dregei Mey.)
mosikiri (G.N.P.) isikiri (Sub.)

Large umbrageous tree. Bark black-brown. Flrs (July—Oct.) creamy white, waxy, sweet smelling. Frts (Dec.—Jany) like a small domestic fig with 2—4 red and black seeds yielding a useful emollient oil which only the Mwambukushi consider edible. Lvs. imparipinnate to 13 ins. l. with 3—5 prs lfts. Wood pink-white, light and easily worked but very prone to attack of wood borers. Hab. moist places, where it is evergreen. A tree with very thin lfts was found at Gomare on the W. side of Okovango Delta, where it was called mochanja. *Curson* 49, 436. *Miller* B/45, B/1070.

TURRAEA L.

Plants with simple, entire lvs. Frts globose.

1. **T. nilotica** Kotschy & Peyr.

Tree to 20 ft high and 8 ins. d.b.h. Bark smooth, pale. Flrs (May—Aug.) white to cream, petals long, curved into a circle. Frts (Aug.—Oct.) 10-celled. Occasional at Serondela, away from the sand sheet. *Miller* B/1042, B/1071. *Pole Evans* 4172. *Rob. & Elffers* 65. *van Son* H28944.

2. **T. obtusifolia** Hochst. var. **microphylla** DC.

Shrub to 4 ft high. Flrs (Dec.—Feb.) white, conspicuous, with long corolla tube. Frts (Mch—Aug.) globose, crimson 1 cm. diam. Lvs. often verticillate. Pharing. *Miller* B/615.

3. **T. zambesica** Sprague & Hutch.
motulu (Kol.)

Tree 12 ft high in thorn scrub near Zambesi Riv. Flrs June. *Miller* B/140.

MALPIGHACEAE

SPHEDAMNOCARPUS Planch.

Climbing plants with pink-green, winged frts and opp., simple lvs.

1. **S. galphimiaefolius** (Juss.) Szyszyl. (includes S. transvaalica (O. Ktze) Burtt Davy)

Flrs (Jany) canary-yell. Hab. rocky ground. Pharing. *Miller* B/977.

2. **S. pruriens** Planch.
makgonatshotlhe (Ngwak.) chipi emagale

Boiled roots used for stomach disorders. *Lugard* 291. *Miller* B/282, B/837. *van Son* H28943.

TRIASPIS Burch.
1. **T. hypericoides** Burch. *var.* **subsessilis** Burtt Davy

"Scrub bush growing to 5 ft high. Flrs pinkish-purple. Frt with brown wings". (2) According to (4), probably collected on way to the Tati Goldfields. *Lugard* 304 type.

POLYGALACEAE

SECURIDACA L.
1. **S. longipedunculata** Fres.
Violet Tree. mmaba (gen.) mofufu (Sub.)

Tree to 20 ft high. Bark pale, smooth, the boles of old trees deeply channelled. Frts (Jany—July) bright yell., winged, 3 cm. l. Flrs appear irregularly, Oct. to Feby, violet to rose or variegated with white, conspicuous, strongly and sweetly scented. Wood white with concentric rings of soft tissue. Roots used for malarial fever. The tree yields the well known Buazi fibre but not used in B.P. In N. Rhodesia oil expressed from the flrs and sent to the Imperial Institute was well reported on. S. limit of range Kanye to Ootsi. *Hillary & Rob.* 493, 552. *Miller* B/142, B/150.

DICHAPETALACEAE

DICHAPETALUM Thouars
1. **D. cymosum** (Hook.) Engl.
mogau (gen.)

Twigs grow from a woody underground stem. Lvs. simple, altern., erect. Flrs white, fragrant. The plant is very poisonous to cattle. *Miller* B/394.

EUPHORBIACEAE

ACALYPHA L.
Herbs, shrubs or small trees with simple nettle-like lvs. Flrs spicate.

1. **A. glabrata** Thbg *var.* **pilosior** (O. Ktze) Prain
moharatsweni (Ngwak.)

Shrub to 9 ft high. Lf-stalk 1 in. long, stipules lf-like. Flrs (Dec.—Feb.) on spikes 1—2 cm. l. Frts (Mch.) minute. Hab. moister spots. Pharing. *Hillary & Rob.* 462. *Miller* B/274.

2. **A. grantii** Bak. & Hutch.
Small tree 9 ft high, 3 ins. d.b.h. Flrs (Dec.) Lvs. larger than no. 1. Serondela *Miller* B/1135.

3. **A. ornata** Hochst. Shrub 4 ft high. Serondela. *Miller* B/1275.

ANTIDESMA (L.) Tul.
1. **A. venosum** Tul.
simai and motoya (Kol.) muxuwa (Sarwa) rongwe, moingwe.
Tree to 25 ft. high. Lvs. simple, altern., entire. Inflor. often galled to resemble a bunch of grapes. Frts edible. *Miller* B/21, B/888. *Rob. & Elffers* 97. *van Son* H28832.

BRIDELIA Willd.
Trees or shrubs with simple altern., entire lvs.

1. **B. cathartica** Bertol. f.
Shrub of N.B.P. Flrs Oct.—Nov. Frts Apl. Easily confused with Phyllanthus reticulatus, *q.v.* *Miller* B/120, B/889. *Pole Evans* 4177.

2. **B. fischeri** Pax
munyinyinka (Kol.)
Shrub to 10 ft high nr Zambesi Riv. Flrs (Mch) pale yell. *Miller* B/130.

3. **B. mollis** Hutch.
mokokokwenana (Kwena), mokokonana (Ngwak.), motakwabula (Sub.) mokokole (Mal.) mokamanawe (Taw.) mokokwele (Kgat.) nkumbankumba (Kalaka)
Common shrub, occasionally a tree to 20 ft high. Lvs. simple, distinctly veined. Flrs (Dec.) sessile, green-yell. with cream-coloured anthers. Frts Apl—Sept. *Miller* B/267, B/870, B/966. *Pole Evans* 3263.

4. **B. niedenzui** Gehrm.
Much like no. 1. Near Zambesi Riv. *Miller* B/195.

CEPHALOCROTON Hochst.
Shrubs with altern. lvs. and terminal flr spikes. In the 2 spp. below, the lvs. are almost sessile.

1. **C. mollis** Kl. *var.* **pilosa** Schinz
"Shrub 4 ft high. Perianth green, stamens and stigma yell." (2). Kwebe Hills. *Mrs Lugard* 70.

2. **C. peschuellii** Pax
Formerly considered a var. of no. 1. *Lugard* 51. *Miller* B/1013.

CROTON L.

Trees and shrubs with simple lvs. with pr of glands at base of lf-blade. Frts somewhat pear shaped with a 3-pronged, grapnel-like process at apex. Nos. 2, 5, 6, and 7 may be conspecific. The wood of these is white, strong, durable, much used for hut building, and surrounding kraals.

1. **C. amabilis** Muell. Arg.

Shrub with yell.-green lvs. in Kwebe Hills. "Lvs. dull, dark brown above, to 6 ins. l." (Hutch. in F.T.A.) *Lugard* 33. *Mrs Lugard* 35.

2. **C. gratissimus** Burch.

moologa (gen.)

Shrub or small tree. Inflor. (Oct.—Nov. May) a raceme of up to 33 flrs, gold-coloured. Lvs. lanceolate, ± 5 cm. l., green above, grey-white, silvery below with numerous red dots. Bark of lower stem corky. According to Burtt Davy (4) the lvs. are quite glabrous above; but see nos. 5 and 6. *Hillary & Rob.* 505. *Miller* B/589, B/591, B/598. *Schonland* 1614.

3. **C. megalobotrys** Muell. Arg. (syn. C. gubouga S. Moore)

motsibi (Taw. & Mang.) mutukatuka (Sub.) pokudza (Kgat.) mubwiti (Kol.)

Tree to 30 ft high. S. limit of range 4 mis. N. of Mochudi. Flrs (Oct.—Dec.) racemose, perianth green, stamens gold-yell. Frts ± 3 cm. l. (Nov.—Dec.). Lvs. nettle-like, ± 7 cm. l. Young bark lenticular. Wood white, useful. *Lugard* 17. *Miller* B/61, B/65, B/92. *Pole Evans* 4000, 4001, 4179.

4. **C. menyhartii** Pax (syn. C. kwebensis N. E. Br.)

"Much branched shrub to 6 ft high" (2), nr Lake Ngami and Kwebe Hills. *Curson* 335. *Lugard* 34. *Mrs Lugard* 41. *Pole Evans* 4095.

5. **C. subgratissimus** Prain (syn. C. gratissimus Prain)

moologa (gen.)

Nos. 2 and 5 grow together in many hundreds at Pharing and are indistinguishable save for the stellate puberulence on the upper surface of no. 5's lvs. As the 2 spp. occupy the same station, have the same flowering periods and lvs. may be found in every intermediate state from glabrous to stellate puberulent, the validity of two separate spp. is doubtful. See *Hillary & Robertson* 505, Also *Miller* B/251 gathered at Sefare and named C. subgratissimus, but "lvs. large for this group". See nos. 6 & 7. *Curson* 536. 796. *Fleck. Miller* B/590, B/592, B/599. B/626.

6. **C. zambesicus** Muell. Arg.

moologa (gen.) mokena (Kol.)

This tree of N.B.P., to 18 ft high and 13 ins. d.b.h. seems to be merely

a large leafed form, about 6·5 cm. l., of no. 2. It has the same flowering period, but the racemes of the northern plants are to 14 cm. l. and may bear up to 90 flrs and flr-buds. *Miller* B/80, B/639, B/1194, B/1195. *van Son* H28831.

7. **C. sp.** cfr. C. zambesicus (Kew)

Shrub on slope of Pharing, i.e. near the locality mentioned in no. 5. *Miller* B/880.

DALECHAMPIA L.

1. **D. capensis** Spreng

segope (Ngwak.)

Climber with woody stem. Flrs (Jany) with large green-yell., hop-like bracts. Lvs. digitate. Kanye Hill. *Hillary & Rob.* 500. *Miller* B/982.

ERYTHROCOCCA Bth.

1. **E. menyhartii** (Pax) Prain (syn. Claoxylon virens N. E. Br.)

tobega.

Shrub to 6 ft high. Kanye to Ngamiland, but nowhere common. Flrs (Aug.—Nov.) very small, yell.-green. Frts (Jany) small, globose, scarlet. Lvs. simple, soft, deep green. *Lugard* 53, 94. *Mrs Lugard* 51. *Miller* B/158, B/159, B/214.

EUPHORBIA L.

Tree euphorbias are unaccountably rare in B.P. Juice milky.

1. **E. monteiri** Hook. f.

"Erect succulent perennial with stem to 1 ft, high branching out into annual green stalks. Flrs maroon". (2) Totin, Ngamiland. *Lugard* 247. *Mrs Lugard* 87.

2. **E. sp.** near E. quadrialata Pax

mogo (Taw.) ngoga (Mang.)

An aphyllous tree 30 ft high near Zambesi Riv. The stem is 4-angled. *Miller* B/198.

FLUGGEA Willd.

1. **F. virosa** (syn. F. microcarpa Blume)

A bushy, dioecious shrub to 8 ft high. Lvs. simple, entire. Flrs Dec. Frts (Jany) small, globose, whitish. *Curson* 790. *Hillary & Rob.* 568. *Miller* B/101, B/102, B/110, B/1054.

PHYLLANTHUS L.

Many stemmed shrubs with simple altern. lvs.

1. **P. maderasapatensis** L.

S. of Lake Ngami. *van Son* H28837.

2. **P. reticulatus** Poir. (syn. P. burchellii Muell. Arg.)

Shrub of Chobe & Maun 8 ft high. *Miller* B/890. *Rob. & Elffers* 50. *van Son* H28834, H28836.

PSEUDOLACHNOSTYLIS Pax

Trees with simple, fresh-green entire lvs. The 3 spp. are much alike.

1. **P. dekindtii** Pax

mukungu (Kol.) mukunyambambi (Mbuk.)

Tree 40 ft high in Baikiaea forest, Mohembo, Ngamiland. *Miller* B/423.

2. **P. glauca** Hutch.

Small tree at Sefare, Ngwato, its probable S. limit of range. *Miller* B/253.

3. **P. maprounaefolia** Pax

mokonu (G.N.P.) mukungu (Kol.) mukunyambambi (Mbuk.)

Tree very like no. 1. Lvs. 4—7·5 cm. l., shining. Chobe, Sefare and Palapye. *Miller* B/252. *Passarge* 90.

RICINODENDRON Muell. Arg.

1. **R. rautanenii** Schinz

Mugongo (Standard Name) mongongo (G.N.P.), mokongwa (Mang.)

Large tree to 45 ft high and 45 ins. d.b.h. Lvs. digitate. Bark pale yell. Frts globose, ± 3—4 cm. diam., much liked by natives and elephant; a valuable oil is expressed from the kernels. Wood light in weight & colour. Chobe to nr. Mahalapye. *Miller* B/136. *Pole Evans* 3314.

RICINUS L.

1. **R. communis** L.

Castor Oil Plant. mokure (G.S.P.) mono (Taw.)

Shrub 8—10 ft high. Frts spinose, used as an emollient and purgative. Introduced, now widespread. *Lugard* 1. *Pole Evans* 4059.

SPIROSTACHYS Sond.

1. **S. africana** Sond.

Tambooti (name among Europeans derived from the Nguni name umtomboti), morukuru (gen.), morekhure (Kgat.)

Tree to 40 ft high. Bark rough, black. Frts (Nov.) harbour an insect which causes them to be a "jumping bean"; seed years are infrequent. Inflor. (Sept.—Oct.), catkin-like, brown. Lvs. simple with shining glands at base of lf-blade, many become scarlet before falling. An excellent furniture wood in great demand, but in B.P. sacrificed to provide

hut poles and rafters. Occurs on Kalahari sand in copses of ½ to 3 acres, in parts of Kwena. Kgatla and Ngwato dists, and in belts along contour of hills in Kanye, Ootsi and Ngwato. It is reported from the isolated Aha Hill in W. Ngamiland. *Miller* B/153, B/656, B/719.

ANACARDIACEAE

HEERIA Meisn.
Plants with simple, conspicuously veined lvs.

1. **H. insignis** (Del.) O. Ktze
Mochudi. *Shantz* 427.

2. **H. paniculata** (Sond.) O. Ktze
monokane
Recorded from Morali Pasture Research Station.

3. **H. salicina** (Sond.) Burtt Davy
monokane (general) nlungu (Kalaka)
Shrub or small tree. Frts (Dec.—Mch) black and white mottled, then black, shining. Flrs (Apl., Oct.—Jany) small. white. The plant yields a resin. *Hillary & Rob.* 519. *Miller* B/235.

LANNAEA A. Rich.
Trees or shrubs with pinnate lvs., green above, grey below.

1. **L. discolor** Engl.
mootswana (Ngwak.) mopyane (Kgat.) ngamba (Kalaka)
Tree 10 ft high. Lvs. altern. or verticillate, lfts opp. Inner bark gummy. Brchlts swollen. Grows from truncheon cuttings. *Hillary & Rob.* 515. *Miller.*

2. **L. edulis** Engl.
peho (*teste* Curson)
Shrublet 1 ft high. Flrs and frts which are edible appear before the lvs., which are used medicinally. *Curson. Miller.*

RHUS L.
Trees & shrubs with 3-foliolate lvs. Flrs green-yell. The frts hang in currant-like bunches and are eaten by native children. The genus requires revision, see Burtt Davy (4) page 494.

1. **R. commiphoroides** Engl. & Gilg (syn. R. kwebensis N. E. Br.)
morupapiri (G.N.P.)
Tree 10 ft high with spinose brchlts. Frts rounded. The common Rhus of N.B.P. *Mrs Lugard* 200. *Miller* B/122, B/131, B/133, B/186. *Pole Evans* 3290, 3291, 4033. *Rob. & Elffers* 78. *van Son* H28763.

2. **R. guenzii** Sond.
motshotlho (G.S.P.) nsasane (Kalaka)

Tree to 30 ft high. In mature trees the brchlts, not spinose, are lax and persist after dying. Lvs. pale green are used as a decoction for bilious disorders. Flrs Apl.—June. Frts Apl.—July, glabrous, yell., hard, flattened. Wood red. *Miller* B/204. *van Son* H28761.

3. **R. lancea** L. f.
Karree Boom. mosilabele (G.S.P.) moshabela (Mal.) moshilabele (Tlokwa)

Common tree from Francistown S. Flrs May—July. Frts (July—Aug.) hard, glabrous, dark brown, flattened. Lvs. dark green, lfts lanceolate. Hab. moister places. *Miller* B/203.

4. **R. magalismontanum** Sond.
mohudichane (Ngwak.)

Bushy shrublet 14 ins. high, often in clefts in rocks. Flrs Sept.—Nov. Frts (Nov.—Dec.) hard, glabrous, flattened. *Hillary & Rob.* 492. *Miller* B/778.

5. **R. pyroides** Burch. (includes R. burchellii (Engl.) Sond.)
mogodiri and mogwediri (Ngwak.) morupapiri (Taw.)

Small tree. Brchlts usually spinose, red. Lfts with very fine hairs or glabrous. Flrs Oct. and Feby. Frts round. Widespread. *Curson* 357. *Miller* B/392, B/398.

var. **gracilis** (Engl.) Burtt Davy

Pharing and Mahalapye. *Hillary & Rob.* 510, 573. *Rogers* 6714.

var. **puberula** Schonland

At Kabulabula, Chobe and Pharing. *Hillary & Rob.* 585. *van Son* 28762.

6. **R. sp.** near R. pyroides. = Flanagan 1405 in Nat. Herb.

Tree 12 ft high on bank Notwani Riv. Gaberones. *Miller* B/219.

7. **R. sp.** near R. refracta E. & Z.
morupapiri (Sub.)

Shrub 5 ft high in thorn scrub near Zambesi Riv. *Miller* B/186.

8. **R.** (? sp. nov.) near R. undulata Jacq.

Not matched at Kew. Tree branching at ground, to 18 ft high. Flrs July—Aug. On slopes above Pharing. Miller B/881, B/908.

9. **R.** (? sp. nov.)

Not matched at Kew. Shrub on termite mound near Pharing. Like R. magalismontanum but 4—6 ft high. *Miller* B/948.

10. **R. sp.**

Tree 8 ft high in Mokhoro vall. on Baratani Hill, dist. Gaberones.

Lf with slightly alate rachis. Lfts spatulate, glabrous, leathery. *Miller* B/561.

SCLEROCARYA Hochst.

1. **S. caffra** Sond.

morula (gen.) morwa (Koba) mfula (Kalaka)

The only sp. Tree to 35 ft high. Lvs. mostly confined to ends of brchlts, pinnate with opp., pointed lfts. + 4 cm. l., 2.5 cm. b. The pulpy frts are eaten raw or made into a meal or beer. The kernel which unfortunately is difficult to deal with, contains a rich edible oil. Flrs (Dec.) pale yell. are said to be dioecious, but see Burtt Davy (4) page 491. At Pharing also a tree which was carefully examined and found to only have male flrs, was felled and then produced a crop of frts. The timber is soft, grey-white with a pink tinge, and used for carving, wooden platters, etc. Its S. limit of range is at Kanye. *Hillary & Rob.* 516. *Mrs Lugard* 38. *Miller* B/100, B/587, B/1119.

CELASTRACEAE

Trees and shrubs with simple, opp. or verticillate lvs.

CASSINE L.

1. **C. sp.**

monomani (Mang.) dikulukhazi (Mbuk.)

"This may be an undescribed sp. of Pseudocassine". Nat. Herb. Tree 12 ft high, much like Pseudocassine transvaalensis (Burtt Davy) Bredell, *q. v.*, but has larger lvs and longer white frts. Gathered on Metsimeseu stream, Serowe, where with the same native name, Pseudocassine also occurs. The wood is made into spoons. *Miller* B/225.

2. **C. sp.**

Shorobe, Ngamiland. *van Son* H28807.

ELAEODENDRON Jacq.

1. **E. capense** E. & Z. (syn. Cassine papillosa Hochst.)

nkonge (Kalaka)

Tree to 30 ft high. conspicuous in Sept. as being in full lf while all other trees deciduous. Bark grey, rather smooth. Flrs (Sept.) inconspicuous. Frts (May) yellow, pulpy, 1 cm. l. Locally abundant 4 mis. S. of Tsessebe, dist. Tati. *Miller* B/919, B/1039.

GYMNOSPORIA Wight & Arn.

1. **G. buxifolia** (L.) Szyszy.

mothono (Taw.) motlhono (G.S.P.) murowanyero (Mbuk.)

A very common, widespread shrub to 10 ft high. Brchlts often spinose. Lvs very variable from 1 to 6·5 cm. l. Flrs (Feby. June—Oct.) very pale green to pure white, a profuse flowerer. Flrs here without smell; in Melsetter dist. they are particularly foul smelling. *Miller* B/625. B/915. *van Son* H28808.

2. **G. ilicina** Davison

Lax shrub 3 ft high on termite mounds or stream banks. Flrs (Nov.) pale yell. Lvs. holly-like, as broad as long, 16 mm. Frts (Feb.) small. Kgapung vall., Lobatsi and nr Mokobane. *Hillary & Rob.* 561. *Miller* B/642, B/766.

3. **G. senegalensis** Loes.

mothono (gen.) mukutema tembuze (Sub.)

A northern sp. with larger, greyer lvs than no. 1. Flrs May. Frts (Aug.) edible. Brchlts somewhat spinose. *Miller* B/20, B/32, B/1131.

4. **G. tenuispina** Szyszy.

mherehere (G.S.P.)

Slender shrub inclined to form thickets about 3 ft high. Lvs. linear. Flrs (Dec.) axillary, on red pedicel. Frt (Dec.) a red, 3-cornered drupe, almost as broad as long, 6 mm. Brchlts thinly spinose. Only seen in lower S.B.P. *Miller* B/544.

5. **G. sp.** nr G. laurina Bolus & Dod

Ngamiland. *Curson* 259, 263.

HIPPOCRATEACEAE

HIPPOCRATEA L.

Climbing shrubs with simple, opp., glabrous lvs. Brchlts usually angled and prehensile.

1. **H. loesneriana** Hutch. & M. B. Moss

In Baikiaea forest. Flrs Mch. *Miller* B/128.

2. **H. nitida** Oliv.

Fringing forest, Chobe Riv. *Rob. & Elffers* 82.

3. **H. obtusifolia**

Fringing forest, Chobe Riv. Lvs 7 cm. l., 2 cm. b. Frts like a 3-bladed propeller. *Curson* 917. *Erens* 257. *Miller* B/439. *Pole Evans* 4055, *van Son* H28849.

4. **H. parvifolia**

"Climbing shrub with greyish bark. Flrs minute, green." (2) *Curson* 98. *Mrs Lugard* 180. *van Son* H29031.

5. **H. sp.**

At Kasane. Not matched at Nat. Herb. *Pole Evans* 4203.

6. **H. sp.**

At Kazungula. Frt (Aug.) of 3 mericarps. Lfless in Aug. *Miller* B/27.

7. **H. sp.** At Kasane. *Pole Evans* 4617.

PSEUDOCASSINE Bredell

1. **P. transvaalense** (Burtt Davy) Bredell

monomani (Mang.) dikhulakazi (Mbuk.)

Tree much like no. 1 Cassine sp. *q. v.*, but smaller lvs and frts. The bark yields a tannin. *Miller* B/224, B/414.

SALVADORACEAE

SALVADORA Garcin

1. **S. persica** Garcin *var.* **pubescens** Brennan

The only sp. Said to yield the "mustard" of the Bible from the lvs, which are simple, opp., entire, succulent and evergreen. A gregarious shrub of N.B.P. in non-sand areas; about 6 ft high. Flrs (June—July) green, inconspicuous. "Frts edible" (20) *Miller* B/37, B/459. *Rob. & Elffers* 55.

SAPINDACEAE

ALLOPHYLUS L.

1. **A. holubii** Bak. f.

Collected on a termite mound in Lesuma vall., Chobe. *Holub.*

PAPPEA E. & Z.

1. **P. capensis** E. & Z. *var.* **radlkoferi** Schinz

mothata (gen.) mopennweng (Kgat. & Kwena)

Tree to 30 ft high. Bark grey. Lvs. simple. 6—8 cm. l., 4 cm. b., altern. or verticillate, entire or serrate on same tree, used for treating venereal disease. Frts (May—June & Aug.) edible, globose, red and fleshy inside the thin woody pericarp; the kernel contains a valuable oil. Inflor. (Jany) racemose, green-yell.; flrs small. "Lobengula's Tree" at Government House, Bulawayo is this sp. *Miller* B/206.

RHAMNACEAE

BERCHEMIA Neck.

1. **B. discolor** (Klotzsch) Hemsl.

motsintsila (Taw.) mozinzila. inzi (Sub.)

Tree of N.B.P. 30 ft high. Flrs (Nov.—Dec.) green-yell. Frts (March—May) yell., pulpy, are an important addition to native dietary. Lvs. simple, distinctly veined, 3—5 cm. l., 3 cm. b., glabrous (*Pole Evans* 4040 is a pubescent form), shining. Wood very hard, used in Ngamiland

to make tobacco pipes. *Curson* 275. *Mrs Lugard* 33. *Miller* B/95, B/126, B/1026.

HELINUS E. Mey.

1. **H. mystacinus** E. Mey.

"Dwarf shrub or creeper. Flrs green". (2) *Lugard* 187. *Mrs Lugard* 197.

MARLOTHIA Engl.

1. **M. spartoides** Engl.

The only sp. At Artesia. *Pole Evans* 3162.

RHAMNUS L.

1. **R. zeyheri** Sond.

Red Ivory. moye (Mal.)

Small tree of S.B.P. Lvs. simple, opp., veins distinct. Frts (Dec.—Apl) 1 cm. l., pulpy, yell. turning plum-coloured when ripe, much like those of Berchemia. Hab. rocky hillsides. *Miller* B/232.

ZIZYPHUS (Tourn.) L.

Trees with edible, red-brown, mealy frts. Lvs. simple, altern. with toothed margins. Spines in prs, 1 straight, 1 recurved.

1. **Z. abyssinica** (A. Rich.) Hochst.

Jujube Tree. mokgalo (gen.)

Small tree at Kazungula, much like no. 2, but lvs. with rusty pubescence on veins on undersurface. *Miller* B/115.

2. **Z. mucronata** Willd.

mokgalo (gen.) monganga (Kol.) moketekete (Mbuk.) n'she'sheni (Kal.k.)

Common tree to 30 ft high. Saplings and coppice make whipsticks; ox yokes cut from larger trees. Flrs (Dec.—Jany) yell. in clusters in lf axils. *Miller* B/109.

3. **Z. zeyheriana** Sond.

mokgalo (Ngwak.)

Shrublet 16 ins. high, gregarious on termite mounds. Lvs. smaller and more sharply toothed than no. 2. Flrs (Nov.) yell. Frts (Dec.) more globose and smaller than no. 2. *Hillary & Rob.* 632. *Miller* B/403, B/678. *Wilmot* 2.

VITACEAE

CISSUS L.

1. **C. fleckii** Schinz

Mabeleapudi Hills. *van Son* H29036.

2. **C. lonicerifolius** Smith
twee (Sarwa)
Shrub 2½ ft high. Flrs (Sept.) yell., precocious. Matetsi village, Chobe. *Miller* B/927.

RHOICISSUS Planch.
Climbers with simple or 3-lobed lvs. Frts grape-like.
mohurukwana (Ngwak.)

1. **R. cuneifolius** (L. f.) (E. & Z.) Planch.
Flrs Sept.—Apl. Frts Dec.—May. Specimen quoted below has also been named R. cirriflora (L. f.) Gilg & Brandt. *Miller* B/456.

2. **R. erythrodes** (Fres.) Planch.
Flrs Sept.—Mch. Frts Nov.—May. Lvs pubescent. *Hillary & Rob.* 495. *Miller* B/707, B/795.

TILIACEAE

CORCHORUS L.

1. **C. pongolensis** Burtt Davy & Greenway
Shrublet 2 ft high. Lvs. simple, toothed, sticky. Flrs (Mch) yell. No native name obtained among about 60 Ngwaketsi; Ngwato name said to be seretwani. *Miller* B/307, B/621.

GREWIA L.
Small trees and shrubs with simple, altern. lvs. Flrs, except nos. 1 and 25 yell. with sepals as brightly coloured as and longer than the petals. Frts as broad as long, brown, 5—12 mm., 1—4 seeded. Bark easily stripped. In addition to the vernacular names given under individual spp., the following were also found indiscriminately applied:—mosapeteke, mhotswa, mankankele, marago aba humagade, chiriza (Sub.) mokomohana (Kal.)

1. **G. avellana** Heirn. (syn. G. calycina N. E. Br.)
Flrs (Dec.) white, sepals very long. Lvs. soft. Ngamiland to Kanye. *Lugard* 237. *Miller* B/531. *Schoenfelder* S. 266.

2. **G. bicolor** Juss. (syn. G. salvifolia Heyne)
Kwebe Hills. *Lugard* 92B. *Mrs Lugard* 121.

3. **G. cordata** N. E. Br.
mogwana (gen.)
Lvs. usually with many tubercles, white tomentum and grey undersurface. *Mrs Lugard* 102 type. *Miller* B/715, B/716, B/867, B/868.

4. **G. flava** DC. (syn. G. cana Sond.)
moretlhetwa (gen.) morezwa (Kal.)
Common small shrub of S.B.P. Flrs Oct.—Feby. Frts edible, much

used to make a slightly alcoholic drink. *Hillary & Rob.* 511. *Miller* B/535, B/540. *van Son* H29029.

5. **G. flavescens** Juss.

Probably conspecific with C. retinervis *q. v.*

6. **G. grisea** N. E. Br. (syn. G. miniata Mast. ?)

mogwana

Lvs with grey undersurface. *Lugard* 54 type.

7. **G. inaequilatera** Garke

From Kabulabula, Chobe. Described as a tree 25 ft high with a 40 ft spread of crown and drooping twigs. *Miller* B/481 may be this sp., collected on the Okovango Delta. *van Son* H29027.

8. **G. kwebensis** N. E. Br.

Lvs. very large for this genus. *Curson*. *Lugard* 92 type. *van Son* H29028.

9. **G. monticola** Sond.

mogwana kgomo (Ngwak.) motuu (*teste Curson*)

Ngamiland to Kanye. Lvs. grey below. *Curson*. *Hillary & Rob.* 534. *Miller* B/601, B/715. *Rob. & Elffers* 73.

10. **G. occidentalis** L.

mogwana and, *teste* Curson, mokukutu and motswetsweyane.

See Thonner, plate 91. *Curson* 93, 132, 567.

11. **G. olukondae** Schinz

mokgompatha

Shrub 6 ft high of N.B.P. Flrs (Dec.) yell. Lvs. green below. *Curson* 297, 458. *Miller* B/1270. *Pole Evans* 3222, 3164.

12. **G. pilosa** Lam. (*non* Auct.)

mapate *teste* Curson.

Ngamiland & Tati. *Curson* 297. *Mrs Lugard* 121. *Pole Evans* 3222.

13. **G. retinervis** Burret

mokgompata (Taw.) motsontsinjane and mokankele (Ngwak.)

Its angular stems used for shafts of throwing-spears. *Curson* 793, 1174. *Hillary & Rob.* 463. *Miller* B/114, B/866, B/1000. *Pole Evans* 3164, 3315.

14. **G. subspathulata** N. E. Br.

Kwebe Hills. "Branching shrub; white-grey undersurface to lvs. which distinguishes it from G. pilosa. *Lugard* 92A type.

15. **G. velutinissima** Dunkley

mokgompatha, motuu (N.B.P.)

Flrs Dec. Lvs. 4 ins. × 2 ins. Frts large with a few long, stiff hairs. Near Gomare, Ngamiland. This spec. should be compared with authentic material of G. kwebensis. *Erens* 375. *Curson* 175, 251. *Miller* B/97, B/433.

16. **G. villosa** Willd.

"Very distinct, quite unlike any other sp." (4) Frts with stiff hairs. "Flrs russet or green" (2). Also collected at ruins of Livingstone's house at Kolobeng. *Lugard* 46. *Mrs Lugard* 108. *Miller* B 242. *Pole Evans* 3336.

17. **G. sp.**

Serondela, Chobe. This spec. may prove to be G. miniata Mast. *Rob. & Elffers* 61.

18. **G. sp.** (? sp. nov.)

Ngamiland & Nata Riv. *Curson* 820. *Pole Evans* 3292.

19. **G. sp.**

Collected at Khomo dia Tsaba, dist. Mochudi. "Possibly G. woodiana K. Schum." Nat. Herb. *Miller* B 475.

20. **G. sp.** near G. rogersii Burtt Davy

mogwana

Flrs (Dec.) yell. Lvs. grey below, 3 cm. l., 1·5 cm. b. Pharing. *Miller* B/540B.

21. **G. sp.** "G. miniata or G. grisea" Kew.

Miller B 869.

22. **G. sp.**

Nr Maun. Not matched. *Erens* 304.

23. **G. sp.**

At Khomo dia tsaba. Not matched. *Miller* B 476, B 474.

24. **G. sp.**

At Pharing. Not matched. *Miller* B 538.

25. **G. sp.** nr G. inaequilatera Garcke.

Lax shrub 4—5 ft high in fringing forest Chobe Riv. Flrs white: lvs. green below.

MALVACEAE

ABUTILON Gaertn.

1. **A. fruticosum** G. & P.

"Erect perennial 2 ft high in Kwebe Hills" (2) *Mrs Lugard* 85.

2. **A. lugardii** Hochst. & Schinz

Kwebe Hills. "Plant 3—4 ft high. Lvs. and calyx very viscid, orange-yell." (2) *Lugard* 148. *Mrs Lugard* 171 type.

3. **A. sp.** cfr A. austro-africanum Hochst.

Shrub 3 ft high near Pharing. Flrs (Nov.) yell. *Miller* B 713.

CIENFUGOSIA Cav.

1. **C. digitata** Pers.

"Perennial to 1 ft high. Flrs yell. with deep red centre, having a fringe-like margin" (2) Lvs. palmatisect to base. Stem annual on a woody rhizome (4) *Mrs Lugard* 94.

GOSSYPIUM L.

Wild Cotton. boboya (Kol.) sesetu (Taw.) Latter name is that of the Honey Guide which uses cotton to make its nest. Lax shrubs to 4 ft high or climbers.

1. **G. herbaceum** L.

Ngamiland. *Curson* 299.

var. **africanum** Hutch. & Goese (syn. G. africanum Watt and includes G. transvaalense Watt) *Miller* B/440, B/1057. *Pole Evans* 3311.

2. **G. obtusifolium** Boxb. *var.* **africanum** Watt

Ngamiland & Chobe. *Curson* 506. *Mrs Lugard* 198 type.

HIBISCUS L.

Plants with simple, altern., often slightly lobed lvs. Flrs change colour with age—yell. to wine-coloured, white to pink. Bark of most spp. yields cordage.

1. **H. caesius** Guerke

Thin stemmed plant 3 ft high. Flrs (Aug.) yell. with a maroon "eye". Ngamiland & Chobe. *Mrs Lugard* 118. *Miller* B/1078, B/1079. *Rob. & Elffers* 79.

2. **H. calyphyllus** Cav.

Shrub 8 ft high. Flrs (May) pale yell. with black-brown centre, 6 cm. l. *Hillary & Rob.* 507. *Miller* B/610.

3. **H. micranthus** L.

Shrub 4 ft high. Flrs irregularly Oct. to June, white to pink. Lvs. with glittering flecks. *Lugard* 38. *Mrs Lugard* 50. *Miller* B/513, B/609.

4. **H. platycalyx** Mast.

"Shrub 3—7 ft high; the only shrubby Hibiscus of the Kwebe Hills. Flrs yell. with chocolate-red centre." (2) *Lugard* 147. *Mrs Lugard* 95. *van Son* H28941.

5. **H. subreniformis** Burtt Davy

motyiba kgomo (Kwena)

Slender shrub to 6 ft high. Flrs (Dec.) canary-yell. Lvs. with glittering flecks. *Holub. Miller* B/539.

PAVONIA L.

1. **P. sp.** nr P. burchellii (DC.) R. A. Dyer

Shrublet 2 ft high. Flrs (Nov.) dark yell. Lower lvs. shallowly 3—5-lobed. *Hillary & Rob.* 508, 606. *Miller* B/725.

SIDA L.

Lvs. 3 to 5-lobed or palmately divided.

1. **S. chrysantha** Ulbr.

Plant 6—8 ins. high. Sub-herbaceous from a woody rhizome. Flrs (Nov.) straw-coloured, turning dark on gathering. *Miller* B/794.

2. **S. cordifolia** L.

"Shrub 1½—2 ft high. Flrs pale yell." (2) *Lugard* 235. *Rob. & Elffers* 76. *van Son* H28928, H28935.

3. **S. rhombifolia** L.

Shrublet 1½ ft high. Frs (Apl) yell. Kgopung vall., Lobatsi and Kwebe Hills. *Lugard* 192. *Mrs Lugard* 167. *Miller* B/622.

4. **S. sp.** cfr S. hoepfneri Guerke and H. dinteriana Hochst.

mherwane (Mang.)

Shrub 3½ ft high on Kanye Hill. Flrs (Nov.) yell. on long stalk. Lvs. glaucous. *Miller* B/704.

THESPESIA Corr.

Lvs. Hibiscus-like.

1. **T. garckeana** F. Hoff.

morajwa (Mang.) moneko (Kol.) ntogwenyane (Kalaka)

Tree 15 ft high. Flrs (Mch—Apl) red-purple, turning yell. Often confused with T. rogersii. Chobe & Serowe. *Miller* B/139, B/853.

2. **T. sp.**

"probably undescribed". Nat. Herb. Collected 25 mis. N. of Kachekau, Chobe. *Pole Evans* 4178.

BOMBACACEAE

ADANSONIA L.

1. **A. digitata** L.

Baobab. moana (Taw.) mobuyu (Kol.) dovuyu (Mbuk.) ibozu (Sub.)

Thick boled tree to 70 ft high and over 20 ft d.b.h. Lvs. digitate (juvenile and epicormic lvs simple). Flrs (Dec.) large, white. Frts large, boat-shaped, green-brown, yielding a pleasing acidulous drink. S. limit of range 3 mis. S. of Mahalapye. *Miller. van Son* H28767.

STERCULIACEAE

DOMBEYA Cav.

1. **D. rotundifolia** (Hochst.) Harv.

Plumblossom Tree. motubane (G.N.P.) molubane, molobare (Mal.) n'ogwinzane (Kalaka)

Tree to 25 ft high with conspicuous, precocious white flrs (Sept.) Lvs. simple, broad as long, rough. Wood used for waggon wheel spokes at Serowe. *Miller* B/654.

HERMANNIA L.

Lvs. simple, altern.

1. **H. tomentosa** Schinz

Plant 1 ft high. Flrs (Feb.) pinkish. Pharing. *Miller* B/824.

2. **H. viscosa** Hiern (syn. H. nyassica Bak.)

Okovango. "Bushy plant 4 ft high. Flrs pink." (2) *Lugard* 236.

MELHANIA Forsk.

1. **M. didyma** E. & Z.

Ngamiland. "Bush 3 ft high. Flrs yell.". (2) *Mrs Lugard* 123. *van Son* H29014.

2. **M. rehmannii** Szysz.

Recorded from "Chue Spring, B.P." (4)

3. **M. sp.** cfr M. acuminata Mast.

Shrub 3 ft high. Stems lax, thin. Flrs (May) yell. Lvs. simple, altern. At Pharing. *Miller* B/586.

STERCULIA L.

Trees with smooth, red and slate or red and white bark. Lvs. simple, altern. with several points or lobes.

1. **S. rogersii** N. E. Br.

mokakata (Mang)

Tree 30 ft high. Frts (Dec.) in clusters of 4—5, globose, 2—2·5 cm. diam. Near Topsi Siding. *Miller* B/803.

2. **S. tomentosa** Guill. & Perr.

mokokobuyu (Kol.) mopopoja (Sub.)

Common as a large tree on Chobe Riv. Frts boat-shaped, green, covered with small irritating sharp hairs. Flrs (Oct.—Nov.) yell. with red stripes. Fibre from bark used to make sleeping mats. *Miller* B/943.

WALTHERIA L.

1. **W. americana** L.

Shrub 2 ft high. Flrs (Apl) yell. in dense clusters. Lvs. simple, altern., serrate. *Curson* 514. *Lugard* 142. *Mrs Lugard* 210.

var. **indica** K. Schum.

Lax shrublet. Flrs (Apl) yell. "Possibly not indigenous". (4) *Curson* 564. *Miller* B/187, B/865.

OCHNACEAE

OCHNA Schreb.

Trees and shrubs with simple, altern. lvs.

1. **O. pretoriensis** Phillips

monyelenyele (gen.)

Shrub to 7 ft high. Bark rough. Lvs minutely serrate. Flrs and frts as in no. 2, but smaller. *Miller* B/82.

2. **O. pulchra** Hook f.

monyelenyele (gen.) mozwe (Mbuk.)

Tree to 20 ft high. Bark rough, but peeling off leaving a very smooth, shining, blue-grey, yell., or pinkish surface. Flrs (Oct.) precocious, yell., conspicuous. Frts conspicuous with enlarged red calyx on which the black seeds are set, usually only 1 or 2 mature. *Curson* 716. *Hillary & Rob.* 494. *Miller* B/239, B/277.

3. **O. sp.** near O. pretoriensis Phillips.

Pharing. *Hillary & Rob.* 476.

GUTTIFERAE

GARCINIA L.

1. **G. livingstonei** T. And.

motsaudi (Taw.) mokonkono (Kol.) mokononga and isika (Sub.)

Large evergreen river bank tree of N.B.P. Juice yell. Lvs. simple, entire, dark, opp. or verticillate. The brchlts are usually about 5 ins. long and grow equidistantly in 3s or 4s. Frt red, edible. *Miller* B/68. *Pole Evans* 4038, 4126.

DIPTEROCARPACEAE

MONOTES A.DC.

1. **M. glaber** Sprague

mwangarara (Sub.)

Tree to 20 ft high. Lvs. simple, entire, altern. Frts 1-seeded, pale brown, leathery, conspicuous, with large persistent calyx. Only one tree seen, at Sitengu Pan in N.E. corner of N.B.P. *Miller* B/143.

ELATINACEAE

BERGIA L.

1. **B. decumbens** Planch.

latsani, lilani, makaikai, *teste* Curson.

This plant has been described as a small tree or shrub and also as an herbaceous climber. *Curson* 66, 242.

FLACOURTIACEAE

Lvs. simple, altern.

DOVYALIS E. Mey.

1. **D. rotundifolia** Harv.

Shrub 8 ft high. Lvs. leathery, ovate. Brchlts spinose. Frts red, edible. Bank of Limpopo Riv. on farm Zanzibar, Tuli Block. *Miller* B/373.

FLACOURTIA Juss.

1. **F. hirtiuscula** Oliv.

Much branched shrub. "Frts edible, well flavoured", Kirk. At Kasane and Tati. *Pole Evans* 3234, 4215. *van Son* H28842.

2. **F. ramontchi** L'Herit.

motumbulwa (Taw.)

Tsessebe and Chobe. Young lvs. red, thin, ovate, shallowly crenate to entire. Brchlts spinose. Frts large, black, shining, edible. See Thonner, plate 104. *Miller* B/1040.

HOMALIUM Jacq.

1. **H. rufescens** Bth.

mchiara and montsiara, *teste* Curson.

Ngamiland. *Curson* 521, 732.

PAROPSIA Nor.

1. **P. brazzeana** Baill.

mwangarara (Kol.). This name also given to Monotes glaber.

Shrub of eastern Chobe. Flrs (May & Sept.) yell. Lvs. thick, stiff, distinctly toothed. 5—7 cm. l. *Miller* B/151, B/929.

RAWSONIA Harv. & Sond.

1. **R. lucida** Harv. & Sond. ?

At Nokoneng, Ngamiland. Lf. spec. only. *Miller* B/429.

SCOLOPIA Schreb.

1. **S. mundii** Warb.

moretlhetle (Ngwak.)

Small spinose tree making a good hut pole. Lvs. with reddish midribs. Flrs inconspicuous. Flrg periods peculiar; an observed tree in 1944

flrd in July, in 1948 in Feby and in 1949 in Sept. It is difficult to distinguish between S. mundii and S. zeyheri. *Miller* B/338, B/339, B/648.

PASSIFLORACEAE

ADENIA Forsk.

1. **A. glauca** Schinz

mohubu (Ngwak.) hulwane (Kgat.) mochacha

Woody climber, with tendrils. Grows from a glaucous tube 10 ins. in diam. Lvs. digitate. Flrs (Dec.) yell. *Miller* B/508, B/530.

THYMELAEACEAE

LASIOSIPHON Fresen.

Shrubs and herbs with opp. or scattered, often appressed, simple lvs. Calyx tube long. Bark with tough fibre.

1. **L. burchellii** Meisn.

Shrub 3½ ft high. Flrs (July) many, fragrant, yell. Pharing. *Miller* B/603.

2. **L. polycephalus** H. H. W. Pearson

"Small virgate shrub 2 ft high with erect glaucous branches. Lvs. few, scattered ¼—½ ins. l. ½—1 line broad. Flrs yell. with a delicious scent" (2). On Botletle Riv. *Mrs Lugard* 4.

COMBRETACEAE

Trees, shrubs and climbers with exstipulate, entire lvs.

COMBRETUM L.

Lvs. opp., altern. or verticillate. Frts winged in 3—4 angles. Flrs racemose or capitate.

1. **C. apiculatum** Sond.

mohodiri-(gen.) kasinsi (Sub.) tsingi'si (Kalaka)

Tree to 18 ft high with hard, dark green, shining, apiculate lvs. Hab. in S.B.P. shallow, stony soils, especially ferruginous quartzite as between Ootsi and Ramoutsa, where it is gregarious. Flrs Oct.—Nov. Frts Apl. *Cardross Grant* 7. *Curson* 243. *Hillary & Rob.* 504. *Mrs Lugard* 25. *Miller* B/73, B/521. *Pole Evans* 3188, 3203. *van Son* H28826.

2. **C. celastroides** Welw.

Tree 10 ft high at Kazungula. Flrs (Dec.) yell. *Miller* B/104, B/105, B/106.

3. **C. coriaceum** Schinz

molubana (Sub.) modubana (Taw.) opupa (Mbuk.) morubana

Whitish barked tree to 35 ft high in Baikiaea forest of Chobe and Mohembo, Ngamiland. *Curson* 329. *Miller* B/178.

4. **C. eilkerianum** Schinz
Botletle Riv. "Tree 20 ft high. Flrs white-green. Frt flat, brown." (2) *Lugard* 9.

5. **C. elaeagnoides** Klotzsch.
Shrub or small tree to 9 ft high in Baikiaea forest. Flrs (Nov.) white. *Miller* B/89, B/111, B/1124.

6. **C. eylesii** Exell
Ngamiland. *Curson* 119.

7. **C. gazense** Swyn. & Bak. f.
molubana, modubana, morubana.
Tree to 30 ft high of Ngamiland. Bark pale, almost white. *Miller* B/415.

8. **C. glomeruliflorum** Sond. *var.* **riparium** Burtt Davy
modubu noka (gen.)
Tree to 25 ft high on river banks. Bark pale brown. Frts small. Inflor. capitate. *Miller* B/617.

9. **C. griseiflorum** S. Moore
Shrub 9 ft high in Baikiaea forest. Lvs smooth. Flrs (Nov.) racemose, white. *Miller* B/111.

10. **C. hereroensis** Schinz
Ramoutsa & Debeeti. *Pole Evans* 3153, 3180.

11. **C. holosericeum** Sond.
modubatsipi (Ngwak.) molatswe, *teste* Curson.
Small tree with dark green, velvety lvs. Flrs (Sept.—Oct.) racemose, yell. Frts (Mar.—Sept.) small. *Curson* 141. *Hillary & Rob.* 518. *Miller* B/309, B/311, B/359, B/510.

12. **C. imberbe** Wawra *var.* **petersii** E. & D.
Leadwood. motswiri (gen.) muvimba (Sub.) mborambunga (Koba, *teste* Chapman) nswiri and mgete (Kalaka)
Large tree with very heavy, hard, durable wood used for grain mortars and palisades. Heartwood black contrasting with the pale yell. sapwood. Burns to a very white ash. Brchlts decussate, somewhat spinose. Flrs Dec. Frts small. *Curson* 129. *Miller* B/96. *Pole Evans* 4015. *van Son* H28823, H28824.

13. **C. kwebensis** N. E. Br.
Kwebe Hills. "Bush 10 ft high. Allied to C. salvifolia Heyne, but readily distinguished by its longer lvs. and flrs and longer peduncles" (2). *Lugard* 48 type.

14. **C. mechowiana** O. Hoff.
modubana (Taw.)
Tree 10 ft high. Flrs (Sept.) yell. *Curson* 811. *Miller* B 490. *Pole Evans* 4134.

15. **C. microphyllum** Klotzsch.
This is a vividly red flrd climber. See C. zastrowii.

16. **C. mossambicense** Engl. (syn. C. trichopetalum Engl. and C. cataractarum Diels)
motweketsane (Taw.) mochekesane, kankolo (Kol.)
Lax shrub 10 ft high, but occasionally with support, to nearly 40 ft. Flrs (Aug.—Oct.) white with red anthers, capitate, conspicuous, precocious. Frts (Oct.) while young and very pale green, conspicuous. *Lugard* 15. *Mrs Lugard* 10. *Miller* B 43. B 334. *Rob. & Elffers* 77. *Curson* 1069, 1109 may be this sp.

17. **C. pachycarpum** E. & G.
Sand dunes 73 mis. N.E. of Maun. *van Son* H28827.

18. **C. parvifolium** Dinter
Tree 8 ft high in Baikiaea forest near Zambesi Riv. Flrs collected in Aug. immature. *Miller* B 641.

19. **C. primigenum** Marloth & Engl.
At Ghansi. *Fleck* 418.

20. **C. rautanenii** Engl. & Diels
At Maun. *van Son* H28819.

21. **C. rhodesicum** Bak. f.
Tree 18 ft high of Chobe & Ngamiland. Flrs (Aug.—Oct.) racemose, pale yell., precocious. *Curson* 309. *Miller* B 33.

22. **C. schumannii** Engl.
mochiara (name also given to Terminalia prunioides)
Small bushy tree to 10 ft high, marginal to Baikiaea forest. Flrs Apl. *Miller* B 134.

23. **C. stevensonii** Exell
"Collected at foot of Goha Hills, Chobe. Lvs to over 5 ins. long, narrow, sometimes in whorls of 3." This plant has been given the name of "Puncture Bush". It is found in thickets over much of the C.D.C. Ranch, Chobe. The broken branchlets can puncture the heaviest lorry tyres. (21) *J. Erens* 354. *Pole Evans* 4599.

24. **C. suluense** Engl. & Diels
Collected at Tantabane Farm, Tati. Lvs softly downy. "Frt up to 4·5 cm. l." (4). *Pole Evans* 3236.

25. **C. ternifolium** Engl. & Diels
Close to C. mossambicense. Flrs Oct. *Miller* B/58. *Shantz* 429.

26. **C. transvaalense** Schinz
mokabi (gen.) mokata (Mang. & Kgat.) mongave (Mbuk.)
May be conspecific with C. hereroense. Probably our commonest sp. From a shrub to a tree 35 ft high and 2 ft d.b.h. with very thick bark. Flrs (Sept.—Oct.) Dry frts make a tea substitute and may be found all the year round. Lvs. not pubescent on either surface. *Curson* 107, 138. *Miller* B/161. *Rob. & Elffers* 104.

var. **villosissimum** Burtt Davy
"adult lvs. mucronate, prominently reticulate and rusty pubescent beneath, thinly grey pubescent above" (4). Gaberones, Maun and "in the Hus Hills", Holub, about 1875. *Holub. Miller* B3310, B/573, B3574. *van Son* H28821, H28833.

27. **C. truncatum** Welw.
At Toting, Ngamiland. "Tree 25—30 ft high. Flrs green, sweetly scented" (2) *Lugard* 29. *Mrs Lugard* 72.

28. **C. ukambensis** Engl.
On Okovango Riv. *Curson* 1117.

29. **C. zastrowii** Dinter & Pocock
mohorutse (Mbuk.)
Sprawling shrub of Baikiaea forest, Mohembo, Ngamiland. Flrs (June) deep red, precocious but persisting until the first lvs. appear which are downy. The virgate stems used to make fish traps. This spec. has also been referred to C. microphyllum Klotzsch and is near C. virgatum Welw. *Miller* B/424.

30. **C. zeyheri** Sond.
modubana (gen.) mosinsi (Sub.) lesapo, *teste* Curson.
Tree to 20 ft high. Bark pale. Frts the largest of our spp. to 7 cm. l. Lvs. glabrous except for the pubescent midrib. Flrs (Oct.), racemose. *Miller* B/6, B/308, B/319.

31. **C. sp.**
"Not matched in Nat. Herb." Collected in Ngamiland. *Curson* 114.

32. **C. sp.**
motenyane (Taw.) motwekesane.
"Matches one other unnamed sheet from Rhodesia in Kew Herb." A climbing shrub in Baikiaea forest on Ngwezumba Riv. Flrs Feb. *Miller* B/181.

33. **C. sp.** "cfr C. elaeagnoides Klotzsch", Kew.

Slender many-stemmed shrub of Baikiaea forest. Flrs (Nov.—Dec.) pale yell., almost white. *Miller* B/1124.

34. **C. sp.**

Not matched at Kew or Nat. Herb. Shrub to 6 ft high in Baikiaea forest, Serondela. Lvs. long, narrow, greyish. Flrs collected in Dec. racemose, immature. *Miller* B/827.

35. **C. sp.**

mfhata (Kwena)

Tree seen 25 mis. W. of Molepolole. 12 ft high with larger lvs. than any other of our spp.

36. **C. sp.**

nr. C. laxiflorum Welw. *Miller* B/827, B/1265.

37. **C. sp.**

nr. C. ternifolium. On C.D.C. Ranch, Chobe. *Pole Evans* 4598.

38. **C. sp.**

kaungolo (Kol.)

Woody climber. Flrs (Jany) small, pale yell. racemose. Serondela. *Miller* B/1274.

PTELEOPSIS E. & D.

1. **P. myrtifolia** E. & D.

mwanzabelo, mufungi and mwanzabalo (Kol.) *teste* Martin.

Small tree of Baikiaea forest, Kazungula. Frt with winged margin. Brchlts may have galls like "oak apples". Lvs. narrow, pointed at both ends. Makes ox yokes. *Miller* B/112, B/194.

TERMINALIA L.

Trees or shrubs with frts with winged margins.

1. **T. prunioides** Laws.

mochiara (gen. name also applied to Homalium rufescens and Combretum schumannii) mochara (Sub. & Kol.) mutororo (Mbuk.)

Tree of N.B.P. The crimson frts conspicuous. Wood hard and tough; Chapman, the explorer, made waggon axles of it. *Curson* 692. *Lugard* 41. *Mrs Lugard* 101. *Miller* B/127, B/190, B/1037. *Pole Evans* 4123. *van Son* H28818.

2. **T. randii** Bak. f.

Tree of the Tati dist. Lvs. small. Frts June. *Miller* B/411. *Pole Evans* 3265.

3. **T. sericea** Burch.

mogonono (gen.) mushosho (Mbuk.) mokuba (Mal.) mususu (Kalaka).

One of our commonest trees. To 30 ft high, but usually much smaller. Often growing gregariously on sandy soil. Frts (Jany—Apl) pink-green turning pale brown. Flrs (Nov.—Dec.) pale yell. or white, racemose. Wood yell., fairly durable, in much demand for hut building. Lvs. pale green with silvery tomentum, used for glazing pots. A browse tree but of low nutritive value. *Hillary & Rob.* 533. *Miller* B/60, B/86. *Pole Evans* 4001, 4217. *van Son* H28817.

4. **T. stuhlmannii** Engl.

Shrub 8 ft high. Much like no 1. Chobe & Ngamiland. *Curson* 103. *Miller* B/118.

5. **T. sp.**

"This spec. may prove to be T. spinosa Engl. of which there is no authentic spec. at Kew. As Engler's name is 4 years older [than Baker's T. randii] it would have priority if conspecificity were established", Kew. Tree 14 ft high on water course 27 mis. W. of Francistown. Lvs. and frts (June) small. *Miller* B/411.

6. **T. sp.** nr T. baumii E. & G. and T. sclozensis Gibbs

Small tree with large lvs. in Lesuma vall., Chobe. Frts much like those of no. 3. Brchlts with large galls. *Miller* B/505.

MYRTACEAE

SYZYGIUM Gaertn.

Evergreen, river bank trees with simple, entire gland-dotted lvs.

1. **S. guineense** (Willd.) DC.

mosane (G.N.P.) motoya (Kol.) mmako, *teste* Curson.

Common tree on rivers of N.B.P. The place name Kasane is derived from the vernacular name mosane. Bark whitish. Flrs (Oct.—Nov.) white. Frts pink-white. A few trees have been observed with bundles of fibrous aerial roots 6 ft up the bole. *Curson* 157, 800. *Miller* B/67, B/72. *van Son* H28950.

MELASTOMACEAE

DISSOTIS Bth.

1. **D. princeps** Triana

Shrub to 5 ft high with conspicuous blue-purple flrs having a distinctly jointed staminal filament. Lvs. opp., simple, ovate-acuminate, distinctly veined. Hab. moist places. Nata. *van Son* H28948.

ARALIACEAE

CUSSONIA Thbg.

1. **C. paniculata** E. & Z.

Cabbage Tree. mosetse (G.S.P.)

Tree to 20 ft high with few, much divided lvs; the lf-stalk to over 1 ft

long; lfts 7—9. Flrs in panicled heads, green. *Hillary & Rob.* 541. *Miller* B/213, B/647, B/650.

STEGANOTAENIA Hochst.

1. **S. araliacea** Hochst. (syn. Peucedanum fraxinifolium Hiern.)
morobolo. muketu (*teste* Martin)

A carroty-stemmed small tree. Sap hemlock scented. Lvs. pinnate. *Miller* B/189. *Pole Evans* 4185. *van Son* H29032.

UMBELLIFERAE

HETEROMORPHA Cham. & Schltr.

1. **H. trifoliata** E. & Z.
mpyeya and serethe (Ngwak.)

Lvs. may be simple, 3-foliolate and pinnate on the same plant. Inflor. (Mch) umbellate. Frts May—June. Bark smooth, peeling horizontally to expose green underbark. Wood brittle. Pharing. *Miller* B/367, B/863.

PLUMBAGINACEAE

PLUMBAGO L.

1. **P. zeylanica** L.
mosikamabe (G.S.P.) bogoma (Kgat.)

Sprawling shrub. Flrs (Mch) white, calyx long, sticky. *Hillary & Rob.* 469. *Lugard* 5, 298. *Miller* B/341. *van Son* H28975.

SAPOTACEAE

Trees, rarely shrubs. Lvs. simple, entire.

CHRYSOPHYLLUM L.

1. **C. magalismontanum** Sond.
motlhatswa (Ngwak.) motlhakwa

Tree 10 ft high. Lvs. with white waxy covering on upper and red-brown tomentum on lower lf surface. Flrs cauliflorous. Frts edible. *Hillary & Rob.* 613. *Miller* B/661, B/785.

MANILKARA Adans.
mochisa (Sub. & Kol.)

1. **M. mochisia** (Bak.) Dub. (syn. Mimusops mochisia)
Tree 35 ft high and 30 ins. d.b.h. Flrs (Dec.) pale yell. Lvs. in whorls dark, leathery. *Miller* B/893, B/1128.

MIMUSOPS L.

1. **M. zeyheri** Sond.
moopudu (G.S.P.) mobu (Sub.)

Small, much branched evergreen tree. Frts plum-like, edible, important in native dietary. "Vitamin C content is 50—80 mgs. per 100 grams

of the edible portion", Dr B. T. Squires. *Miller* B/245. *van Son* H29001.

2. **M. sp.** nr M. zeyheri

chisamutizua (Sub.)

Tree 35 ft high with good cylindrical bole on Chobe Riv., Serondela. Flrs (Oct.) white. Frts edible. *Miller* B/337, B/1161.

3. **M. sp.** possibly M. sylvestris S. Moore

moopudu (Ngwak.)

Tree 15 ft high on Kanye Hill. Frts, Mch, edible. *Miller* B/298.

4. **M. sp.** nr M. kirkii and M. ausaramensis.

moopudu

Tree 15 ft high on rocky slope 2 mls. E. of Molepolole. *Miller* B/220.

5. **M. sp.** nr M. caffra E. Mey.

Tree 40 ft high on termite mounds at Sitengu and Mukamba Pans, Chobe. This may be Manilkara mochisia. *Miller* B/893.

EBENACEAE

DIOSPYROS L.

Trees with simple, altern., entire lvs.

1. **D. batocana** Hiern.

m njongolo (Kol.)

Tree 15 ft high. Bark thick, rough, black. Flrs (Sept.—Oct.) cauliflorous, white, waxy. Frts 5 cm. l, 3 cm. b., globose, velvety. Lesuma vall., Chobe. *Miller* B/480.

2. **D. mespiliformis** Hochst.

African Ebony (Standard Name) mokochong (Taw.) muchenje (Kol.) utunda (Mbuk.) mbiriri (Sarwa)

Dark foliaged tree to 35 ft high, evergreen on river banks (deciduous in Tati dist, *teste* Wilmot). Wood not ebony-coloured, easily worked. Frts (Sept.) edible, with persistent calyx, globose. *Miller* B/294, B/1178. *Pole Evans* 4071.

EUCLEA L.

Evergreen trees and shrubs with black or black-purple (except no. 4), shining, pill-like edible frts. Lvs simple and except in nos. 4 and 5, glabrous. Flrs small, yell., fragrant. A difficult genus.

1. **E. divinorum** Hiern.

motlhakola (Taw.) mutla kula (Sub.)

Tree 17 ft high. Flrs Jan. *Curson* 1108. *Erens* 240, 242, 229, 254 *Miller* B/28, B/831, B/875. *Rob. & Elffers* 47. *Schoenfelder* S.155. *Sullivan* H292.

2. **E. lanceolata** E. Mey.
musukula (Kol.) mokgwelekgwele and motakola (Taw.) motlhakolana, mokgwara (Kwena) motlhakolwana (Nwgak.) mushitondo (Mbuk.) agagule and ntshekesane (Kalaka)

Shrub 7 ft high. *Miller* B/446

var. **myrtina** Hiern.

Gaberones. *van Son* H28829.

3. **E. multiflora** Hiern.

Tati dist. *Pole Evans* 3262.

4. **E. natalensis** A. DC.
motlhakola, montsu wa matlhabele (Ngwak.)

Shrub 8 ft high. Frts (Feb.—Mch) red. Lvs. large for this genus, softly hairy. *Miller* B/687, B/314, B/588. *Pole Evans* 3261, 3262.

5. **E. racemosa** Murr.

Frts distinctly, lvs. sparingly hairy. A very bushy shrub among rocks. *Miller* B/446.

6. **E. undulata** Thbg.
motlhakola (G.S.P.)

Flrs March. *Miller* B/149, B/658, B/846, B/847.

7. **E. sp.**

"We have no material quite like this", I.F.I. Pharing. Flrs (June) many, yell., fragrant. *Miller* B/623.

ROYENA L.
Shrubs with simple lvs., opp. or in whorls. The vernacular names apply to all spp.
motlhaja (Kgat. & Tlhokwa) letadjwa (Taw.) letlhabywa (Kwena) movitshi (Mbuk.) letlhaja (Ralong).

1. **R. decidua** Burch.

Flrs pale yell., fragrant (Sept.—Dec.) Frts globose 1—2 cm. diam., red, with persistent sepals. *Hillary & Rob.* 524. *Lugard* 293. *Miller* B/1047, B/1006. *Rob. & Elffers* 524.

2. **R. hirsuta** L.

Miller B/467.

var. **microphylla** (Burch.) Burtt Davy

Miller B/1094, B/485.

3. **R. pallens** Thbg.

Miller B/679, B/830.

4. **R. sericea** Bernh.

Miller.

OLEACEAE

JASMINUM L.
Shrubs. Lvs. of 3—7 lfts.

1. **J. fluminense** Vell. (syn. J. mauritianum Boj.)
molatsampya and mogohe, *teste* Curson.
Curson 144, 806. *Lugard* 230. *Pole Evans* 4182. *van Son* H28960.
2. **J. stenolobum** Rolfe
Shrub 3 ft high of Chobe & Ngamiland. Flrs (Nov.) white, sickly sweet, calyx tube with 12—14 pointed lobes. Frts (Jany) black, shining, calyx persistent. Lvs. hairy. The lfts have the appearance of being simple lvs., altern. except at ends of brchlts where they are verticillate. *Curson* 209, 219. *Miller* B/155, B/1121.
3. **J. sp.**
Scrambling shrub. Flrs (Nov.) white. Kazungula. *Miller* B/383.

OLEA L.
1. **O. africana** Mill. (syn. O. verrucosa Link.)
Wild Olive. motlhware (gen.) mokgwari (Ngwak.)
Much like the European Olive tree. On termite mounds grows to 30 ft high and 30 ins. d.b.h. Lvs. simple, opp., entire, pale green above, yell.-grey below. An evergreen much browsed by livestock. *Hillary & Rob.* 523. *Miller* B/799.

SCHREBERA Roxb.
1. **S. sp.** cfr. S. buchananii Bak. & S. trichoclada Welw.
mokauke (Taw. & Sub.) mokaoke (Kol. *teste* Martin)
Tree 25 ft high, 14 ins. d.b.h. Frts (Aug.) elongated-pear shaped, $2\frac{1}{2}$ ins. l. Lvs. large, simple, opp., lanceolate. "Corolla with long tube and 4—8 imbricate lobes" (20). Spoons made from root wood. Kazungula. *Miller* B/643, B/1090.

LOGANIACEAE

LACHNOPYLIS Hochst.
1. **L. heterotricha** C. A. Smith
mokwerekwere and mohatantswe (Ngwak.)
Small tree 15 ft high of rocky hillsides. Flrs (May) cream coloured. Lvs. in whorls, leathery. *Miller* B/315.
2. **L. sp.** "between L. heterotricha & L. pubescens."
Shrub 8 ft high, Kanye Hill. *Hillary & Rob.* 543. *Miller* B/286.

STRYCHNOS L.
Trees & shrubs, some of which have strychnine in frt and bark. Lvs. entire, simple with the outer pr of veins parallel to the margin. Frts are orange-shaped with shining rind (except no. 6); some are edible.

1. **S. cocculoides** Bak.
mohoruhoru and mohoruhorwana (Kol.)

Evergreen tree 8 ft high. Lvs. stiff, mucronate. Bark corky. Kanye Hill. *Miller* B/554.

2. **S. innocua** Del. (syn. S. dysophylla Bth.)
mutemi (Toka)

Tree to 30 ft high. Frts (Sept.) edible. Lvs. small. Bark pale, smooth. *Miller* B/109A, B/1091.

3. **S. pungens** Solered
mohwahwa (Kwena) mutu (Mbuk.)

Tree 20 ft high. Lvs. as in no. 1. Flrs (Dec.) waxy, pale yell., with ring of hairs inside corolla. *Miller* B/965.

4. **S. schumanniana** Gilg
mogorugorwana (Kwena) mohoruhoru (Taw.) umi & m tu (Mbuk.)

Tree 20 ft high. Lvs. narrow, sharply pointed at apex. Spines decussate, opp. to each pr of brchlts. Bark corky. *Miller* B/240, B/434.

5. **S. spinosa** Lam.
mogorogoro (G.N.P.) muyimbili (Kol.)

6. **S. stuhlmannii** Gilg
morumbarunde (Taw.)

Unarmed tree to 35 ft high, 2 ft d.b.h., often with several trunks. Near Serondela where it is plentiful it is often uprooted by elephant which eat the roots. Bark pale, often scored horizontally with teeth marks of baboons. The black, shining, plum-like frts (May—June) eaten by baboons and hornbills, said to be very poisonous to humans. Flrs (Nov.) green-yell. Lvs to 7 cm. l., are soft. *Miller* B/137, B/1045. *Rob. & Elffers* 58.

7. **S. sp.** nr S. cocculoides Bak.
mohoruhoru (Taw.) umi (Mbuk.)

Tree 12 ft high. Frts edible. Mohembo. *Miller* B/434.

APOCYNACEAE

Plants with milky juice. Lvs. simple, opp., entire.

BAISSEA A.DC.

1. **B. wulfhorstii** Schinz
mothenyani (Taw.) mayatu (Kol.)

Climber in Baikiaea forest, with thin woody stem (3 mm. diam.) to 10 ft long; base of stem somewhat corky. Lvs. have the appearance of being prs in a pinnate lf; lanceolate, 16 mm. l., 6 mm. b. Flrs (Oct.) white. Follicles narrow, sharply pointed. *Miller* B/183, B/1109.

CARISSA L.

Lvs. hard, leathery, opp., simple.

1. **C. bispinosa** L.

simboba (Taw.) serokolo and morokolo

Evergreen shrub 3 ft high. The brchlts are spinose and usually forked. Flrs (Sept.—Oct.) white, strongly and pleasantly scented. Frts red, shining, edible. Lvs. shining. *Miller* B/670, B/677.

2. **C. edulis** Vahl *var.* **tomentosa** Stapf

Lax shrub 8 ft high, occasionally with support 20 ft. Flrs (Aug.—Sept.) pinkish white. Brchlts tomentose, not forked. Frts red. *Lugard* 16. *Miller* B/1086, B/1101. *Pole Evans* 4009. *Rob. & Elffers* 107.

DIPLORRHYNCUS Welw.

1. **D. angustifolia** Stapf

mulya (G.N.P.) mongoma (Mbuk.) manyela sibuku (Tati dist. *teste* Wilmot.)

Tree 12 ft high. Flrs (Oct.) white. Frts woody, like a small brown oyster shell; seeds winged. Latex used for bird-lime and as a specific for screwworm. *Miller* B/78, B/934.

LANDOLPHIA Beauv.

1. **L. capensis** Oliv.

Small rambler. Flrs (Aug.) white, fragrant. Frts (Dec.) golf ball-like. Kgapung vall., Lobatsi and Kanye Hill. *Hillary & Rob.* 539. *Miller* B/829, B/910.

ONCINOTIS Bth.

1. **O. sp.**

Small twining shrub of N.B.P. Frts (Aug.) torpedo-shaped. *Erens* 374. *Miller* B/29. *Pole Evans* 4146.

STROPHANTHUS DC.

1. **S. kombe** Oliv. (syn. S. hispidus DC.)

mukutingi (Kol.) zwezwe (Taw.)

Sprawling shrub of N.B.P. Stem to 4 ins. diam. Flrs (Sept.) with long filamentous ends to corolla lobes. Frts (July) 8 ins. l., in prs, cigar-shaped; seeds with tufts of white hairs, furnish the drug strophanthin. Lvs. sparse. *Miller* B/25, B/46.

ASCLEPIADACEAE

Plants with milky juice. Lvs. simple. Frts follicles, single or in prs. Except Asclepias, the spp. mentioned below are climbers.

ASCLEPIAS L.
Lvs. opp. or verticillate.
1. **A. fruticosa** L.
mosita nokana (Taw.) modilela

Shrub 3—10 ft high. Lf-blades 2—6 ins. l. Yields a good fibre for sewing clothes and snaring birds. *Baines s. n. Miller* B/377.
2. **A. rostrata** N. E. Br.

Shrub 3—5 ft high, much like no. 1 "from which it is distinguished by a smoother, longer-beaked frt. Flrs creamy white." (20) *Lugard* 22, 231.

CRYPTOLEPIS R. Br.
1. **C. oblongifolia** Schltr.
kgabantswe (Ngwak.)

Shrub 3 ft high. Lvs. 1 cm. l., shining. Bark red-brown, tough. Flrs (Dec.) whitish, inconspicuous. Frts (Apl—May) in prs, thin, tapering to fine points both ends. Hab. rocky places. Easily mistaken for Landolphia capensis when not in frt. *Miller* B/527, B/543.

FOCKEA Endl.
1. **F. lugardi** N. E. Br.

"Creeping over rocks; flrs green." (2) Kwebe Hills. *Lugard* 299, type.
2. **F. sp.** (? F. schinzii N. E. Br.)

Large climber 40 ft long and 12 ins. diam. at ground level. Bark smooth, shining. Lfless in June. Frts solitary. At Ngoma on Chobe Riv. *Miller* B/1059.

GYMNEMA R. Br.
1. **G. sylvestre** R. Br.

The only sp. A hairy climber. Lvs. opp., ovate. Flrs (Jany) yell., with white centre. Inner bark felty. Roots powdered to make an ointment for boils. Frts solitary. *Miller* B/295, B/1051.

MARSDENIA R. Br.
1. **M. zambesiaca** Schltr.

Woody climber. "Frts green" (Lugard.) "Flrs creamy white" (Mrs Lugard) "Flrs white; frts solitary or occasionally in prs." (Miller). *Lugard* 60. *Mrs Lugard* 17. *Miller* B/105, B/1056.

STOMATOSTEMMA N. E. Br.
1. **S. monteirae** N. E. Br.

The only sp. Flrs (Dec.) corolla bell-shaped with oblong segments, white, mottled brown-purple within. *Miller* B/330, B/1051.

TACAZZEA Decne.

1. **T. kirkii** N. E. Br.

litiela (Kol.)

Shrub on Chobe Riv. bank. Lvs. simple, opp., lanceolate. Juice milky. Inflor. axillary, flrs red without, green-yell. within, paniculate. *Miller* B/1280.

CONVOLVULACEAE

Lvs. simple, altern. Petals united into a 5-lobed corolla. (20)

IPOMOEA L.

1. **I. shirambensis** Bak.

muchare (Sarwa)

Woody climber of Chobe dist. Flrs (Aug.) white-mauve, precocious. *Miller* B/926, B/1088. *Rob. & Elffers* 91.

SEDDERA Hochstr.

1. **S. suffruticosa** Hall f. *var.* **hirsutissimus** Hall f.

Shrublet, stem & lvs. ashy grey on both surfaces, densely clothed with silky hairs to 4 cm. l. Flrs (Oct.) white. On Kgomo dia Tsaba Hill, dist. Mochudi. *Miller* B/473.

The typical form, "a ground creeper", was collected on the Kwebe Hills. *Lugard* 184. *Mrs Lugard* 203.

BORRAGINACEAE

Lvs., at least the upper ones, altern., undivided, usually hairy. Inflor. usually raceme- or spike-like (20)

CORDIA L.

1. **C. gharaf** (Forsk.) Ehrenb.

mwarasupe (Taw.)

Scrambler on termite mound. Flrs (Sept.) in heads. Okovango Delta. *Miller* B/487.

2. **C. sp.** (? pilosissima Bak.)

mutulu (Sub.)

Sprawling tree on Chobe Riv. bank. 2 stems of forked trunk each about 2 ft. diam. Lvs. ± broad as long, to 12 cm., soft. *Miller* B/1029.

EHRETIA L.

Shrubs to 12 ft high. Lvs. altern. or more usually verticillate. The genus requires revision.

1. **E. coerulea** Guerke
morobe (gen.)
Flrs (Nov.) lilac coloured. *Miller* B/84.
2. **E. hottentotica** Burch.
morobe (gen.)
Common, widespread. Flrs (Sept.—Dec.) pale blue. Frt globose red turning black. *Miller.*
3. **E. mossambicensis** Klotzsch.
"3—4 ft high. Flrs white, lilac or mauve." (2). Kwebe Hills. *Lugard* 36, 37. *Mrs Lugard* 48.
4. **E. rigida** (Thbg) Druce
At Pharing. *Hillary & Rob.* 525.

SERICOSTOMA Stocks
1. **S. avolans** Fenzl.
3 ft high. Flrs (Aug.) white & red with dense long hairs. Bark of upper stem green, smooth: of lower, brown, rough. Kanye Hill. *Miller* B/916.

VERBENACEAE

Lvs. opp. or whorled, very rarely altern., simple, except Vitex.

CHASCANUM E. Mey.
1. **C. pumilum** E. Mey.
Woody plant 16 ins. high. Flrs (Mch) white. 16 mls. E. of Khakea, Kalahari. *Miller* B/1015.

CLERODENDRUM L.
Lvs. opp. or verticillate.
1. **C. glabrum** E. Mey.
An evil-smelling shrub. Flrs (Apl) white, in clusters. Tati. *Pole Evans* 3231, 3260.
2. **C. lanceolatum** Guerke
"Shrub $2\frac{1}{2}$ ft high. Corolla snow-white, filaments red, anthers yell. Has an offensive smell when bruised" (2). Kwebe Hills. *Lugard* 91. *Mrs Lugard* 98.
3. **C. myricoides** R. Br.
Shrub 3—5 ft high. Lvs. 2 to 4-nate, deeply toothed but entire at base. "In Leshumo Forest" [Lesuma. nr Kazungula]. *Holub.*
4. **C. simile** Pearson
legonnyane, *teste* Curson.
Ngamiland. *Curson* 338, 735.

5. **C. spinescens** (Oliv.) Guerke (syn. Kalaharia spinescens Oliv.)

Bushy shrub 18 ins. high. Often armed with small hooked or straight spines at the nodes. Flrs (Aug.) conspicuous, crimson. *Baines* s. n. *Lugard* 234. *Miller* B/1085. *Rob. & Elffers* 88. *Gertrude Theiler* 18585. *Watermeyer* s.n.

6. **C. sp.** nr C. myricoides

Shrub 3 ft high. Calyx white with purple rim. Frts are sometimes connate, the calyx persistent. Khale Hill, Gaberones. *Miller* B/184.

7. **C. sp.**

Ngamiland. *Curson* 390.

DURANTA L.

1. **D. plumieri** Jacq.

mhita obdule (Ngwak.)

A naturalised shrub with long, lax branches. Frts with 4 seeds, bright orange, conspicuous. Flrs (Mch) blue, in many flrd cymes, conspicuous. Pharing. *Miller* B/299.

LANTANA L.

Inflor. cymose. Lvs. opp., toothed.

1. **L. salvifolia** Jacq.

mosukudu (Ngwak.) dikobetsa badisana, *teste* Curson

Low shrub. Flrs (Dec.) white or mauve, in heads. *Hillary & Rob* 512. *Holub. Lugard* 68. *Miller* B/534. *Rob. & Elffers* 87.

2. **L. sp.**

kgobedimabu (G.S.P.) mosukujwani (G.N.P.)

Shrub with reddish-white flrs. *Miller.*

LIPPIA L.

1. **L. asperifolia** Rich.

mosukutswana (Ngwak.) mosukubyane (Mang.)

Common bushy shrub. Flrs (Oct.—Dec.) in densely packed heads. Lvs. which have a mint-like smell used as a tea substitute. *Miller* B/712.

PREMNA L.

1. **P. senensis** Klotzsch.

Lax shrub. Lvs. simple, 12 cm. l., 7·5 cm. b. Flrs (Nov.) white, small, corolla 4-lobed, turning yell. after gathering, racemose. Serondela. *Miller* B/1120.

VITEX L.

Trees or shrubs with digitate lvs. and racemose inflor.

1. **V. mombassae** Vatke

Tree 9 ft high in Baikiaea forest, Chobe. Frts Apl. This spec. proved difficult and the determination was made at Kew. *Miller* B/3.

2. **V. zeyheri** Sond.

mokwele (G.S.P.)

Shrub 3—5 ft high. Lfts glaucous. Flrs (Nov.) pale blue. Hab. rocky ground. *Hillary & Rob.* 491. *Miller* B/234.

3. **V. sp.**

Not matched in Nat. Herb. Flrs (Nov.) from a coppice shoot in Baikiaea forest, Serondela. *Miller* B/381.

LABIATAE

Stems usually 4-angled. Lvs. opp. or whorled, very rarely altern., simple. Branches opp. Flrs in cymose false-whorls.

BECIUM Lindl.

1. **B. angustifolium** N. E. Br.

mogatururu (Ngwak.)

A strongly scented plant 18 ins. high. Flrs (Apl.—Dec.) white. Lvs. linear. Bark rough, stringy. Included in Ocimum by Thonner. *Miller* B/571, B/613.

HEMIZYGIA Briq.

1. **H. elliotii** (Bak.) M. Ashby

Woody plant 8 ins. high. Flrs (Oct.) mauve. Pharing. *Hillary & Rob.* 490. *Miller* B/515.

HOSLUNDIA Vahl

1. **H. opposita** Vahl (syn. H. decumbens Bth.)

Shrub 3 ft high. Flrs (Dec.) white. Frts (Dec.) orange-coloured. Described in F.T.A. as a "much branched shrub to 15 ft high. Lvs. opp. Corolla lilac. Frt-calyx red, edible." Found in thorn scrub nr Zambesi Riv. and at Leshuma and Tamatsetse by Holub. *Holub. Miller* B/103, 154.

IBOZA N. E. Br.

1. **I. sp.** cfr I. bainesii

mosito

Aromatic shrub 3½ ft high. Flrs (Sept.) mauve, very small. Lvs. deeply serrated. In gorge ¼ mile W. of Kanye. *Miller* B/917, B/1095.

OCIMUM L.

1. **O. knyanum** Vatke

"Erect perennial 18 ins. high. Flrs mauve, aromatic." (2) Kwebe Hills. *Mrs Lugard* 67.

2. **O. tereticaule** Poir.

"Perennial 2 ft high, aromatic. Flrs purple. Lvs sometimes variegated" (2) Kwebe Hills. *Lugard* 96. *Mrs Lugard* 84.

SOLANACEAE

Lvs. altern; sometimes in prs; simple, but sometimes dissected. Flrs solitary or in cymose inflor. (20)

LYCIUM L.

Trees or shrubs with spinose brchlts. Lvs entire, usually in whorls of up to 10.

1. **L. albiflorum** Damm.

lebutha (Taw.)

Shrub 6 ft high on termite mound. Flrs (Sept.) white. Frts small, globose, red. *Miller* B/488.

2. **L. arenicolum** Miers

"Shrub 9 ft high with blue-green, ridged branches. Lvs. without stalks" (21) Kwebe Hills. *Lugard* 70.

3. **L. caespitosum** Dinter & Damm.

Ghansi. *Dinter* 1964 (type ?) *van Son* H29016, H29017.

4. **L. oxycladum** Miers

Shrub 2½ ft high. Flrs (Apl) mauve. *Miller* B/500.

5. **L. tenue** Willd.

sitsautsau (Kal.)

Shrublet 2 ft high. Flrs (Mch) pale mauve. At Tsane, Kalahari. *Miller* B/1007.

6. **L. tetrandrum** Thbg.

morokolopodi

Shrub 3 ft high. Flrs June. At Mokobane. *Tittlestad* H787.

7. **L. sp.**

moroto a phiri (Kgat.) = horse urine.

Shrub 1 ft high. Flrs (Apl) small, blue. Mochudi. *Miller* B/572.

NICOTIANA L.

1. **N. glauca** R. Graham

Tree Tobacco.

An introduced shrub 8 ft high with glaucous lvs. Dam wall in Kanye village. *Miller* B/212.

SOLANUM L.

1. **S. coccineum** Jacq.

Lax shrub 4 ft high. Frts (Mch) red-brown. Lvs with prickles. Pharing. *Hillary & Rob.* 481. *Miller* B/844.

2. **S. incanum** L.

"Shrub 5 ft high, densely hairy. Corolla to 1½ ins. diam., white or purple. Frts yell. to 1½ ins. diam." (20) Lvs. with or without prickles. Kwebe Hills. *Lugard* 18.

3. **S. kwebense** N. E. Br.

mwarasupe (gen.)

Unarmed shrub 4½ ft high. Flrs (Oct.) white or pale yell. Frts small. *Lugard* 50. *Mrs Lugard* 52. type. *Miller* B/469.

4. **S. omitiomirensis** Dumm.

2½ ft high. Flrs (Jany) white. Lobatsi. *Miller* B/1154.

5. **S. panduraeforme** E. Mey.

"Much branched shrub 2—4 ft high. Spines few or many. Corolla violet". (2). *Hillary & Rob.* 486. *Lugard* 55. *Mrs Lugard* 19. *Miller* B/576. *van Son* H29020, H29021.

WITHANIA Pauq.

1. **W. somnifera** Dunal.

Shrub 5 ft high. Flrs (Nov.) green, in clusters. Lvs. entire. *Curson* 280. *Miller* B/93. *van Son* H29018, H29019.

SCROPHULARIACEAE

ANTHEROTHAMNUS N. E. Br.

1. **A. rigida** (L. Bolus) E. P. Phillips (syn. A. pearsonii N. E. Br.)

Shrub to 8 ft high. Lvs. simple, very small, in whorls of 3. Flrs small, many in 1 head, cream coloured. It may flower in almost any month of the year. Hab. base of rocky hills. *Hillary & Rob.* 628. *Miller* B/501, B/518, B/793.

APTOSIMUM Burch.

1. **A. lineare** Marl. & Engl.

"Collected nr Tklane Pits. A dwarf undershrub" (21). "Flrs deep purple" (2). *Lugard* 230.

HALLERIA L.

1. **H. lucida** L.

Wild Fuchsia. No Tswana name.

So far only one plant recorded, though very common in many parts of S. Africa. The B.P. spec. comes from a tree 12 ft high (larger therefore than usual) with its roots in the intermittent Pharing Gorge stream. In 1946 floods broke off the stem and the plant now consists of coppice shoots only. Corolla tube to 3 cm. l, brown-red. Lvs. simple, opp., entire. *Miller* B/275.

SUTERA Roth.

1. **S. atropurpurea** Hiern (syn. Lyperia atropurpurea Bth.)
"heath-like undershrub 3 ft high" (21). Botletle vall. *Lugard* 267.

2. **S. burkeana** Hiern
Woody plant 2 ft high. Flrs (Feby) brown-purple. Pharing. *Miller* B/838.

WALAFRIDA E. Mey.

1. **W. paniculata** Rolfe
Prostrate woody, mat-like plant. Flrs (May) white. Lobatsi forest plantation. *Miller* B/1156.

BIGNONIACEAE

CATOPHRACTES G. Don

1. **C. alexandri** G. Don
motswara chukudu (Taw.) mogwadiri, *teste* Curson
The only sp. Shrub 3½ ft high. Flrs (Jany) large, conspicuous, blue-white. Frts (Oct.) grey, woolly. Lvs. simple, greyish. Ngamiland to Serowe & Francistown. *Curson* 162, 462. *Lugard* 65. *Mrs Lugard* 83. *Miller* B/920. *Pole Evans* 4025.

KIGELIA DC.

1. **K. pinnata** DC.
Sausage Tree. mizungula & izungwe (Sub.) mporota (Taw.) mubungu-bungu (Mbuk.)
Large tree of river banks. Flrs (Sept.), large, showy, eaten by antelopes. Frts sausage-shaped to 2 ft long with milky juice in cortex. Lvs. pinnate, large. Used to make dugout canoes. The place name Kazungula is from this tree. *Lugard* 233. *Miller* B/40. *Pole Evans* 4173. *Rob. & Elffers* 109.

MARKHAMIA Seem.
Calyx spathe-like, split down one side. Frt with winged partition. Lvs. pinnate.

1. **M. acuminata** K. Schum.
"Tree 10—20 ft high. Flrs from russet to maroon. Pod long, brown". (2) *Curson* 142, 775. *Lugard* 58. *Mrs Lugard* 55. *Miller* B/805. *van Son* H28775.

2. **M. lanata** K. Schum.
mupatalwala (Sub.) mositsanyate (Kgat. & Taw.)
Small tree. Flrs (Jan.) yell. Frt 20 ins. l., seeds many. Makes a good axe handle. *Curson* 73. *Miller* B/108.

RHIGOZUM Burch.

Calyx bell-shaped.

1. **R. brevispinosum** O. Ktze.

mohurukwana (Ngwak.) mfurokwane (Kgat.) lokubulwrana (Kal.)

Shrub often gregarious; 4 ft high. Flrs (Aug.—Dec.) yell., conspicuous. Lvs. simple, whorled, on hairy bosses. Occasionally a few lvs. are found at ends of brchlts 3-foliolate, the lfts the same shape as the lvs. *Curson* 765. *Hillary & Rob.* 584. *Miller* B/703, B/722, B/10008.

2. **R. trichotomum** Burch.

lokubulwrana (Kal.)

A gregarious shrub to 6 ft high in grassland just above high water line of pans in S.W. Kalahari. *Miller* B/1011. *van Son* H28776, H28777.

PEDALIACEAE

Plants with glandular hairs. Lvs. opp., at least the lower ones simple. (20)

SESAMOTHAMNUS Welw.

1. **S. lugardi** N. E. Br.

moboana, siboana *teste* Cardross Grant

Chakutsa Pan, Ngamiland, the type locality; and Tati dist. Trunk greatly swollen at the base from which arise several tapering stems. "Spiny shrubs with long white flrs, like Gardenia but corolla tube with long narrow spur at base" (10). *Grant* 10. *Lugard* 274, type. *Miller* B/1149.

ACANTHACEAE

Lvs. whorled or opp., simple.

BARLERIA L.

Lowly plants. Lvs. without prickles or teeth.

1. **B. eenii** S. Moore

Shrublet with woody stem, brchlts semi-woody. Flrs (May) salmon-pink turning white when withered. Thin, sharp prickles at nodes. *Miller* B/1049. *Pole Evans* 4042. *van Son* H28685.

2. **B. galpinii** C. B. Cl.

Shrublet to 15 ins. high, among rocks. Stipules large, grey. Bracts large, red-brown. *Miller* B/994.

3. **B. lugardii** C. B. Cl.

A perennial of the Kwebe Hills. Flrs white. *Lugard* 128, type. *Mrs Lugard* 106.

4. **B. mackenii** Hook. f.

"branches minutely and densely white-hairy, glabrescent. Lvs. $2\frac{1}{4}$ ins. by 1 in., narrowed at both ends. Racemes mostly reduced to 1 flr, corolla mauve" (21). *McKen* s.n. type. *Lugard* 124.

5. **B. macrostegia** Nees

Procumbent plant with woody root stock. Flrs (Apl) blue, in heads with many bracts 4 cm. b. and l. *Lugard* 295. *Miller* B/1022. *van Son* H28682.

BLEPHARIS Juss.

1. **B. diversispina** C. B. Cl.

A perennial gathered on the Botletle Riv. Flrs blue. *Mrs Lugard* 6

CRABBEA Harv.

1. **C. velutina** S. Moore

A perennial of the Kwebe Hills. Flrs white. *Lugard* 131. *Mrs Lugard* 96.

DISPERMA C. B. Cl.

Flrs in axillary clusters. Bracts oblong, about as long as calyx.

1. **D. sp.** (sp. nov. ?) cfr D. dentatum C. B. Cl. & D. scrabridum S. Moore.

Thin stemmed shrub 3 ft high on "black turf" of Chobe Riv. Lvs. and scales have a very pungent smell, oily. Used as an insecticide. Flrs (June. Nov.) blue-purple. *Miller* B/31, B/333. *Pole Evans* 4171. *Rob. & Elffers* 92.

DYSCHORISTE Nees

1. **D. transvaalensis** C. B. Cl.

Shrublet to 1 ft high. Flrs (Oct.—Nov. May) pale blue. Lvs. opp., entire. *Hillary & Rob.* 489. *Miller* B/509, B/612.

ECBOLIUM Kurz.

Frts flat, 2-seeded. Flrs in spikes.

1. **E. cognatus** N. E. Br.

"Shrublet 18 ins. high. Corolla bright sky-blue" (2). At Chukutsa Pan, Ngamiland. *Lugard* 223 type.

2. **E. lugardae** N. E. Br.

"A much branched shrublet 18 ins. high. Corolla light blue" (2) *Mrs Lugard* 212 type.

JUSTICIA L.

1. **J. odora** C. B. Cl.

Many stemmed sprawling shrublet. Flrs (Jany—May) yell., conspicuous. Lvs. entire, sparse. Ngamiland to Kanye. *Hillary & Rob.* 467. *Lugard* 72. *Mrs Lugard* 160. *Miller* B/281.

2. **J. sp.**

Not named in Nat. Herb. Shrub 2 ft high. Flrs (June) white with yell. lobes. Pharing. *Miller* B/624.

MONECHMA Hochst.

1. **M. incanum** C. B. Cl.

mogato (Kal.)

Shrublet with twisted, stringy bark. Flrs (Mch) white. Lvs. opp., entire, glaucous. Tsane & Kokong. *Miller* B/345. B/10009, B/1020.

2. **M. nepata** C. B. Cl.

"Perennial to 2 ft high. Flrs pale mauve or purple-white" (21). *Lugard* 172. *Mrs Lugard* 131.

PETALIDIUM Nees

1. **P. latifolium** C. B. Cl.

"2—3 ft high with soft silvery foliage: upper 4 lobes of corolla brick-red, lower lobe yell." (21). *Lugard* 121. *Mrs Lugard* 12.

RUELLIA L.

1. **R. patula** Jacq.

"small shrub. grey pubescent or sparsely hairy. Lvs. from $\frac{1}{2}$ by $\frac{1}{4}$ to $2\frac{1}{2}$ by $1\frac{1}{4}$ ins." (21). Flrs (Nov.) pure white. Hab. stony ground. Kwebe Hills and Pharing. *Hillary & Rob.* 484. *Lugard* 45, 49, 68. *Mrs Lugard* 63. *Miller* B/796.

2. **R. prostrata** T. And.

"Perennial to 2 ft high. Flrs mauve." (2). *Mrs Lugard* 89.

RUBIACEAE

Lvs. opp. or whorled, entire, sometimes with lf-like stipules. (20).

ANCYLANTHUS Desf.

Corolla curved. tubular. Stigma 5-lobed. (20)

1. **A. bainesii** Hiern.

mmkutso, *teste* Curson

Shrub of Ngamiland. *Curson* 791.

CANTHIUM Lam.

1. **C. frangula** S. Moore

moswatyembe (Taw.) muswatshembe (Sub.)

Lax, bushy shrub 9 ft high. Lvs. to 4 cm. l., whorled. Spines decussate. Flrs (Dec.) small, green. Serondela. *Miller* B/1126.

2. **C. gilfillani** N. E. Br. (syn. Plectronia gilfillani **N.** E. Br.)

Shrub or small tree on bank of Muhoro, a permanent stream in Baratani Hill, dist. Gaberones. Frts (Dec.) oblong. *Miller* B/560.

3. **C. huillense** Hiern.
modumelantswe (Ngwak.) monyonyana

Common small tree, usually on rocky ground in S.B.P. The brchlts and lvs. lie in one horizontal plane. Lvs. glabrous or slightly pilose. Flrs (Dec.) greenish, inconspicuous. Frts Jany. *Miller* B/533, B/555, B/556.

4. **C. randii** S. Moore
moopudu (Taw.) This name also applied to Mimusops sp.

Tree to 18 ft high and 10 ins. d.b.h., of Baikiaea forest. Flrs (Nov.—Dec.) green-yell. Frts March. Bark pale yell.-brown, smooth. Stem straight, fairly durable used as a hut pole. Lvs. ovate-acuminate, thin, 8 cm. l. by 7 cm. b. *Miller* B/124, B/1122.

5. **C. sp.** = C. A. Smith 6565 and Gerstner 5357.

Much like no. 3, but lvs. longer, to 7 cm. *Miller* B/543, B/557.

CROSSOPTERYX Fenzl.

1. **C. febrifuga** Bth.
molenga. malamatwa

Tree 20 ft high. Lvs. elliptic, entire, opp. Frts erect, egg-shaped, shining, dark brown, opening by 4 valves, ± 10 mm. l. "Flrs in panicles, corolla salver-shaped" (20). Kazungula. *Miller* B/637.

DIRICHLETIA Klotz.

1. **D. pubescens** Klotz.

Shrub 3 ft high. Flrs (Dec.) white, conspicuous, calyx large, 3-lobed. Kasane. (This plant found in flr in April nr Wankie, S. Rhodesia) *Miller* B/1138.

EMPOGONA Hook. f.

1. **E. kirkii** Hook. f.

Shrub 3 ft high in Combretum thicket nr Kasinka, Chobe. Flrs (Dec.) white. Frts Apl. "Flrs solitary or 2—3 together, without an epicalyx, calyx deeply lobed." (20). *Miller* B/191.

GARDENIA Ellis

1. **G. capensis** (Thbg.) Druce

Collected nr Pharing. Lvs. dark, leathery, 6—7 cm. l. Flrs not seen. *Hillary & Rob.* 546. *Miller* B/913.

2. **G. resiniflua** Hiern.

Shrub 6 ft high. Frts immature in Jany. Chobe and Ngamiland. *Curson* 111. *Miller* B/1282.

3. **G. spathulifolia** Stapf & Hutch.
morala (gen.) sulu (Kol.) kabunga (Sub.) moravi (Mbuk.) mtamba (Kalaka)

Small branchy tree, often erroneously named G. thunbergia. Flrs (May to Dec.) to 9 cm. l., white turning dark cream, with powerful Gardenia smell. Frts football-shaped (*forma rugbeia*), hard, indehiscent, blue-grey, ± 7 cm. l., usually with about 7 longitudinal grooves. Wood white, tough, used to make spoons. Lvs. spatulate, but juvenile lvs. not so. Brchlts. in 3s or 4s, equally spaced apart at nodes. Widely distributed tree. *Hillary & Rob.* 473. *Miller* B/48, B/717, B/779, B/933. *Pole Evans* 4122, 4188.

PAVETTA L.

Shrubs with conspicuous heads of white flrs and pill-shaped, shining frts.

1. **P. assimilis** Sond var. **brevituba** Brem.

Shrub 6 ft high, 3 mis. S. of Topsi Siding. Lvs. spatulate. *Miller* B/806.

2. **P. cataractarum** S. Moore

Ngamiland. *Curson* 92.

3. **P. eylesii** S. Moore

kaijiwe (G.S.P.)

Shrub or small tree, 8 ft high. Bark brown, rough and half peeled off, often to ends of brchlts. Lvs. large for this genus. Flrs Dec. Frts Apl. *Harbor* s.n. *Miller* B/313, B/331.

4. **P. harborii** S. Moore

The type was collected nr Mochudi. A shrublet of 8 ins. high, which resembles no. 7 except in stature. *Harbor* s.n. type. *Watermeyer* H992.

5. **P. lasiopetalus** K. Schum.

Ngamiland. *Curson* 378.

6. **P. marlothii** Bremek.

Type collected by Marloth in Mochudi dist. Shrublet 1 ft high. Close to no. 4. *Marloth*. *Miller* B/478.

7. **P. zeyheri** Sond. var. **sonderi** Brem.

maitla a dilule (Ngwak.) matiadule (Gaberones) tshitabanna

Slender tree to 12 ft high. Flrs (Dec.) yell.-white. Frt with a few stiff hairs. Bark whitish, striate. *Hillary & Rob.* 590. *Miller* B/243, B/332, B/529.

PYGMAEOTHAMNUS Robyns

1. **P. zeyheri** (Sond.) Robyns

moko (Ngwak.)

Annual shoots from a long horizontal rootstock. Flrs (Nov.—Dec.) yell.-green. Plant sometimes confused with Dichapetalum cymosum, but is not poisonous. *Miller* B/327, B/767.

var. **oatesii** (Rolfe) Robyns

Mochudi. *Marloth* 3333.

RANDIA Houst.

1. **R. vestita** S. Moore

Armed shrub 8 ft high. Flrs (Dec.) yell., Gardenia-like. Kazungula, Chobe. *Miller* B/384.

TAPIPHYLLUM Robyns

1. **T. parvifolium** (Sond.) Robyns (syn. Vangueria parvifolium Sond.) monyunwana

Shrub or tree to 10 ft high. Frts edible, crowned by the persistent calyx, 5-seeded, ± 2·3 cm. diam. *Hillary & Rob.* 499. *Miller* B/260, B/553, B/558.

TARENNA Gaertn.

Flrs in terminal corymbs. (20)

1. **T. luteola** Brem.

Shrub of the Baikiaea forest. Flrs (Nov.) white. *Miller* B/88.

VANGUERIA Juss.

Small trees and shrubs. Frts usually edible.

1. **V. infausta** Burch. *non* Hiern.

Wild Medlar. mmilo (gen.) mothwanye (Ngwak. & Tlapeng) mothwane and monyunyanɪ (Ngwak.)

Tree ± 8 ft high. Lvs about 8 cm. l., tomentose, ovate-acuminate. Flrs yell.-green, inconspicuous. Frts (Nov.) *Hillary & Rob.* 520. *Miller* B/228.

2. **V. lasiocladus** K. Schum.

"Bush to 6 ft high. Flrs green." (2) Kwebe Hills. *Mrs Lugard* 59. *Miller* B/193 from Kazungula may be this sp.

3. **V. tomentosa** Hochst.

Shrub 3—4 ft high. Flrs (Dec.) green. Khale Hill, Gaberones dist. & Kazungula. *Miller* B/98.

4. **V. sp.**

"nearest V. proschii Briq." (3). Collected at Kasane. *van Son* H28843.

5. **V. sp.** = Fraser 5837

Ngamiland. *Curson* 812.

The following native names were found applied to Vangueria spp.—moko, monyunyane, motwanye, momuntsumuntsu.

COMPOSITAE

The Daisy family. Leaves simple.

ARTEMISIA L.

1. **A. afra** Jacq.

Wormwood. longana (gen.)

Shrub to 3 ft high. Lvs. deeply incised, sage green above grey below, strongly smelling, somewhat mint-like, used medicinally and as a tea substitute. Flrs racemose, pappus wanting. *Miller.*

ASTER L.

1. **A. muricatus** Less.

An ericoid shrublet 5 ins. high. Flrs (Feby.—July) yell. *Hillary & Rob.* 549. *Miller* B/841, B/907.

BLUMEA DC.

1. **B. gariepina** DC.

mokudjani (G.N.P.)

Bushy shrub 2½ ft high. Lvs. small, pointed, grey-green. Flrs small, red or yell. Resembles Pluchea leubnitziae, *q.v.* *Miller* B/551. *Pole Evans* 4073.

BRACHYLAENA R. Br.

1. **B. rotundata** S. Moore

mohotantswe (Ngwak.)

Small tree in Mohoro vall., dist. Gaberones and Kapung vall., nr Lobatsi. village. Lvs. ± broad as long, 6 cm., pale green above, with white tomentum below, which can be rubbed off. Flrs (Sept.), pappus bristles in 2 rows. *Hillary & Rob.* 542. *Miller* B/559, B/676.

EURYOPS Cass.

1. **E. sp.**

Shrublet 8 ins. high on eroded ground nr Serowe. *Miller* B/227.

GEIGERIA Greisselich

1. **G. sp.**

makudi (sub.)

Shrub 2—3 ft high. Flrs (Dec.) yell. Lvs. altern., sessile. On sandy soil, Kachekau Flats, Chobe and in Ngamiland. *Curson* 363. *Miller* B/385.

PHILYROPHYLLUM O. Hoffm.

1. **P. schinzii** O. Hoffm.

"Bushy plant to 6 ft high. Flrs yell." (2) "Frts 10-ribbed." (20) *Lugard* 257. *Pole Evans* 4037.

PLUCHEA Cass.

1. **P. leubnitziae** (O. Kuntze) N. E. Br.

mokudjani (Taw.) mokoli and makodi, *teste* Curson.

Much like Blumea gariepina. *Curson* 29, 40. *Lugard* 1A. *Miller* B/291. *Pole Evans* 4100.

PSIADIA Jacq.

1. **P. arabica** Taub. & Spach.

mosikamabi (Ngwak.)

Slender single-stemmed shrub 3 ft high. Flrs (Oct.—June) yell. Lvs, linear, dark green, shining. Pharing. *Hillary & Rob.* 591. *Miller* B/284.

PTERONIA L.

1. **P. glauca** Thbg.

Small shrub with glaucous lvs. Flrs (Sept.) yell. Western Kalahari. *Miller* B/350.

TARCHONANTHUS L.

1. **T. camphoratus** L.

mohatlha (Ngwak.)

Small tree. Lvs. entire, aromatic, glaucous. Ripe frts like fluffy, dirty white balls. Wood burns when green. *Miller* B/202.

VERNONIA Schreb.

Lvs. simple, altern.

1. **V. amygdalina** Del.

monqo (Kob.)

Tree 13 ft high in grassland between Shorobe village and Gomoti Riv. Maun. Flrs (June) in broad heads, white, conspicuous. *Miller* B/442.

2. **V. colorata** Drake (syn. V. senegalensis Less.)

"Tree 15 ft high. Flrs cream coloured, highly scented. Okovango, Botletle & Taokhe valls." (21). *Lugard* 249. *Pole Evans* 4070, 4129.

3. **V. vitellina** N. E. Br.

Shrub with many slender stems 10 ft high. Inflor. (June) pale brick-red, in heads of 4—12, at ends of brchlts. Frts (June—July) with dingy pappus. *Lugard* 251. *Miller* B/1059, B/1060.

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GLOSSARY OF TERMS

ABBREVIATIONS

A

alate, with wing-like expansion
anther, pollen sac
aril, expansion of the funicle
armed, having spines, thorns
axillary, in angle formed by stem and leaf

B

b., broad
B.P., Bechuanaland Protectorate
bract, modified leaf between calyx and normal leaves
brchlt., branchlet

C

calyx, outer envelope of the flower
capitate, collected in a compact, head-like round cluster
carpel, simple female organ
cauliflorous, produced from the old wood
clavate, club shaped
cm., centimetre: about $\frac{2}{5}$ of an inch
compound, divided into separate leaflets
connate, united
coriaceous, leathery
corolla, inner envelope of the flower
corymb, flat-topped flower-cluster
crenate, notched with blunt teeth
cyme, broad flattened flower-cluster

D

d.b.h., diameter breast height
decussate, in pairs alternately at right angles
dehiscent, opening by valves, or slits
digitate, with leaflets diverging from the same point
dioecious, with male and female flowers on different plants
dist., district

E

entire, with margin whole and even, without toothing or division
ex descr., from the (published) description

F

filament, stalk bearing the anther
flrs, flowers, but sometimes includes inflorescence
frt., fruit
ft., foot: feet, measure
F.T.A. Flora of Tropical Africa
funicle, stalk bearing the seed

G

gen., general
glabrous, smooth, without hairs
glaucous, bluish or grey-green
G.N.P., general in northern Protectorate
G.S.P., general in southern Protectorate
globose, nearly spherical

H

H before a number = herbarium, not collector's number
hab., habitat
Herb., herbarium
hom. homonym, the same name given invalidly to a different plant.

I

in., inch
indehiscent, not dehiscent or opening by valves
inflor., inflorescence, a flower cluster
I.F.I., Imperial Forestry Institute, University of Oxford

J

jugate, yoke: pair

K

Kal., language of the Bakgalagadi
Kalaka, language of the Bakalaka
Kgat., language of the Bakgatla
Kob., language of the Bakoba
Kol., language of the Makololo

L

l., long
lanceolate, shaped like a spearhead
legume, pod
lft., leaflet
lenticel, lenticular, (with) corky spots on young bark
linear, long, narrow with parallel margins
lobe, division of an organ, especially a rounded division
loc., locality
lvs., leaves

M

Mal., language of the Bamalete
Mang., language of the Bangwato
Mbuk., language of the Mwambukushu
midrib, centre or main rib of leaf
mm., millimetre
moniliform, constricted over the seeds, necklace-like

N

N., north: northerly
Nat. Herb., National Herbarium, Pretoria
Ngwak., language of the Bangwaketsi
nr., near

O

opp., opposite
ovate, egg-shaped in outline

P

palmatisect, with divisions pointing to apex of petiole
pappus, thistle-down
patent, spreading
pedicel, stalk of a single flower
peduncle, stalk bearing one or several flowers
petal, a leaf of the corolla perianth
perianth, calyx, corolla or both
petiole, foot stalk of a leaf
pinna, primary division of a compoundly pinnate leaf
pinnate, divided into pinnae
pr., pair
precocious, appearing when plant is leafless
prickles, small, sharply pointed excrescences on leaves
pubescent, covered with hairs

Q

q. v. which see

R

raceme, simple inflorescence of pedicelled flowers on an unbranched common axis
racemose, having a raceme: raceme-like
rachis, axis of a compound leaf
riv., river
reticulate, like the meshes of a net
Rob. Collector's name—Miss R. Robertson

S

S., south: southerly
sepal, leaf of the calyx
serrate, toothed
sessile, stalkless
simple, of one piece, not compound
sp., species, one
spp., species, more than one
spec., specimen
spicate, spike, of flowers arranged on a simple, undivided stalk
spine, sharp pointed outgrowth from the bark, not connected with cambium layer of wood
spinose, of suppressed branchlets ending in a spine-like point—an outgrowth of the wood, not excrescent
stamen, one of the male organs of the flower
staminode, sterile or abortive stamen
standard, fifth or posterior petal of papilionaceous corolla
stipitate, having a stipe or special stalk
sub-, almost
syn., synonym

T

tri- (3) foliolate, with 3 leaflets
Taw., language of the Batawana
terete, circular in section
teste, on the evidence of
Tlhok., language of the Batlhokwa
tomentum, tomentose, a covering of, covered with, soft hairs

U

umbel, umbellate, inflorescence in which a cluster of pedicels spring from the same point

V

verticillate, whorled

W

whorl, of leaves set in a circle

Y

yell., yellow

ALPHABETICAL LIST OF NATIVE NAMES OF TREES, SHRUBS, ETC., WITH SOME GRASSES AND OTHER HERBACEOUS PLANTS

B

bannabothe. *Crotalaria lotoides*
boboya. *Gossypium* spp.*
boboya. *Xanthium spinosum* burrweed.
bogopa. *Setaria verticillata*, grass.
boguma. *Setaria sphacelata*, Kazungula Setaria Grass.
bolatsi. *Kalanchoe rotundifolia.*
bophaphe. *Lippia nodiflora.*

C

chitamatuzua. *Mimusops* sp.*
chiwonza. *Acacia stolonifera* var. *chobiensis**

D

digobetsa badisana. *Lantana salvifolia**
dikojwana. *Corallocarpus sphaerocarpus*, red fruited, climbing cucurbit.
dovuyu. *Adansonia digitata**
duwa. *Hippocratea loesneriana**

F

funde. *Vellozia retinervis*, blue flrd plant on sheet rock, stem used as a brush.

G

gaijiwe. *Pavetta eylesii**
godja ga dinonyani. *Setaria sphacelata*, Kazungula Setaria Grass.
gogwana. *Arthrosolen polycephala*, yell.-flrd weed.
gomoti. *Ficus verruculosa**
gu. *Acacia arabica**

H

hulwane. *Adina glauca**

I

ibozu. *Adansonia digitata**
ijwairi. *Acacia kirkii**
inkoma. *Papyrus* spp.
ipopoja. *Sterculia tomentosa**
isika. *Garcinia livingstonei**
isikiri. *Trichilia emetica**
isunde. *Baphia obovata**
ivomena. *Kirkia acuminata**
izungwe. *Kigelia pinnata**

K

kabunga. *Gardenia spathulifolia**
kaijiwe. *Pavetta eylesii**
kakomo. *Albizzia versicolor**
kananga. *Acacia albida**
kangarangana. *Acacia retinens**
kankolo. *Combretum mossambicense**
kasinsi. *Combretum apiculatum**
kaungolo. *Combretum* sp.
kenyani. *Imperata cylindrica*, grass.
keye. *Dichrostachys glomerata**
kgabantshwe. *Cryptolepis oblongifolia**
kgalahete. *Talinum caffrum*, yell.-flrd pioneer.
kgatlo. *Gymnema sylvestre**
kgobedimabu. *Lantana* sp.*
kgotudwa. *Nidorella residaefolia*, yell.-flrd herb.
konggwane. *Arthrosolen polycephala*, yell.-flrd weed.
kotsharuwa. *Vernonia steetziana* O. & H. herb with cornflower-coloured flrs of Kalahari
kowatshi. *Asparagus* spp.
kuma. *Papyrus* spp.
kwaipi. *Osyris compressa**

L

lebutha. *Lycium persicum**
lebelebele. *Pennisetum spicatum*, grass.
lefhetho. *Pogonarthria falcata*, grass.
lefshwe. *Gymnema sylvestre**
legonnyana. *Clerodendrum simile**
lehatlho. *Geigeria* sp.
lehuto. *Phragmites mauritianus*, reed.
lelane. *Bergia procumbens**
lenapa. *Rhynchelytrum roseum*, grass.
lenyele. *Sesbania aegyptiaca**
lenko. *Albizzia versicolor**
letlhaka. *Phragmites mauritianus*, reed.
letlhakana. do.
lerula. *Acacia nebrownii**
lerura. do.
lerwana. do.
lesapo. *Combretum zeyheri**
lesatswane. *Ochna* sp.?
leshotwe. *Brachiaria nigropedata*, grass.
leshwe. *Pentarrhinum insipidum*, climber with pointed follicles and milky juice.
leshwi. do.
lethajwa. *Royena* spp.*
letlhabye. do.
letlhaja. do.
letsane. *Nesaea mucronata.*
letshoo la khudu. *Ranunculus pubescens*, buttercup.

For names marked * see previous pages.

letsitsi. *Hibiscus cannabinus*, a fibre plant.
leunedi. *Asparagus* spp.
litanga. *Fockea schinzii**
likulukhazi. *Cassine* sp.*
logetlha. *Bulbine* sp., yell-flrd lily with yell. juice.
logolo. *Aptosimum marlothii*, purple flrd herb.
lokobulwana. *Rhigozum trichotomum**
lokwati. Name given to several trees and useless for identification purposes.
longana. *Artemisia afra**
loka. *Cotyledon orbiculata.*
lutshi. See leshwe.

M

mabele. *Setaria sphacelata*, grass.
maduma marago magolo. *Themeda triandra* (forma), grass.
magwatwa. *Blepharis maderaspatensis*, white flrd herb.
maitla a dilule. *Pavetta zeyheri**
majokwani. *Hydnora* sp., large edible tuber.
makakari. *Harpagophyton procumbens*, the Grapple Plant.
makankele. *Grewia* spp.*
makgonatsotlhe. *Melolobium** sp. and *Sphedamnocarpus pruriens**
makudi. *Pluchea leubnitzae** and *Geigeria* sp*
makuku. *Hibiscus cannabinus*, a fibre plant.
makulwane. *Heteropogon contortus*, grass.
malamatwa. *Crossopteryx febrifuga**
maladitapi.
malete anjwa. *Gloriosa* spp., red flrd lilies.
mangole. *Digitaria eriantha*, grass.
manyelaseboko. *Diplorhynchus angustifolia**
maphate. *Grewia pilosa**
marago aba humagade. *Grewia* spp.
marago magolo. *Cymbopogon* sp., grass.
marama golo. *Bothriochloa glabra*, grass.
marete. *Hibiscus cannabinus*, a fibre plant.
maseka. *Digitaria eriantha*, and *Eleusine indica*, grasses.
matakwaboli. *Bridelia mollis**
mathiadule. *Pavetta zeyheri**
mbaimbai. *Amblygonocarpus obtusangulus**
mborambunga. *Combretum imberbe**
mbuti. *Citrullus naudinianus*, cucurbit.
mchiara. *Homalium rufescens**
mfhafha. *Panicum maximum*, grass.
mfhata. *Combretum* sp.*
mfurokwane. *Rhigozum brevispinosum**
mhaha. *Panicum arcurameum*, grass with edible seeds.
mhahu. *Acacia* spp.*
mharatshweni. *Sphedamnocarpus transvaalicus**
mhata. *Lonchocarpus nelsii**
mhatlhwantse. *Lachnopylis heterotricha**
mhawa. *Ficus soldanella**
mherehere. *Gymnosporia tenuispina**
mherwane. *Sida* sp.*
mhetula. *Indigofera* spp.*
mhita obdule. *Duranta plumieri**
mhota. *Commiphora* spp.*
mhotswa. *Grewia* sp.*
mhure. *Acacia arabica**
mhutswana. *Acanthospermum hispidum*, Erect Starbur.
mkakama. *Cymbopogon excavatus*, grass.
mkalati. *Burkea africana**
mkutso. *Ancylanthus bainesii**
mmaba. *Securidaca longipedunculata**
mmabi. *Urera tenax**
mmako. *Syzygium guineense**
mmilo. *Vangueria infausta**
mmola. *Parinari capensis** and *Albizzia rogersii**
mmola hatshe. *Parinari capensis**
mmono. *Ricinus communis**
mmopudu. *Mimusops* spp.*
moana. *Adansonia digitata**
moarungarunga. *Albizzia struthiophylla**
mobeane. *Lannea discolor** and *Sesamothamnus lugardii**
moboana. *Sesamothamnus lugardii**
mobokololo. *Cassia obovata*, yell.-flrd. herb.
mobola. *Parinari mobola**
mobola hatshe. *Parinari capense**
mochaba. *Ficus* spp.*
mochacha. *Adenia glauca**
mochanja. *Bauhinia macrantha**
mochara. *Terminalia prunioides**
mochare. *Ipomoea shirambensis**
mochope. *Bauhinia macrantha**
mochwarakgano. *Albizzia versicolor**
modija. *Peltophorum africanum**
modilela. *Asclepias fruticosa**
modubana. *Combretum* spp.
modubatshipi. *Combretum holosericeum**
modubu noka. *Combretum glomeruliflorum**
modumela. *Kirkia acuminata**
modumelantswe. *Canthium huillense**
modutu. *Celtis africanus**
mofurokwane. *Rhigozum brevispinosum**
moga. *Acacia robusta** and *A. detinens**
mogata wa pheba. *Setaria sphacelata*, grass.
mogato. *Monechma incanum**
mogatololwane. *Plinthus laxifolius.*
mogatururu. *Becium brevispinosum**
mogau. *Dichapetalum cymosum** and *Clematis* spp.*
mogodiri. *Rhus pyroides**
mogohe. *Jasminum fluminense**

For names marked * see previous pages.

mogokatau. *Acacia ataxacantha**
mogolo. *Melolobium* sp.*
mogolori. *Rhus* sp.*
mogonono. *Terminalia sericea**
mogorogoro. *Strychnos spinosa**
mogotho. *Acacia giraffae**
mogotiri. *Celtis africanus**
mogotlho. *Acacia giraffae**
mogotolwane. *Plinthus laxifolius.*
mogogorwana. *Strychnos schumanniana**
mogwadibe. *Pseudocassine transvaalensis**
mogwadiri. *Catophractes alexandri**
mogwagwa. *Strychnos* spp.*
mogwagwana. *Scolopia mundii**
mogwana. *Grewia* spp.*
mogwediri. *Rhus pyroides**
mohamani. *Dialium simii**
mohambia. *Ximenia* spp.*
moharatswene. *Acalypha glabrata**
mohata *Lonchocarpus capassa**
mohatantswe. *Brachylaena rotundata** and *Lachnopylis hetero*richa**
mohatla. *Tarchonanthus camphoratus**
mohatlha. *Tarchonanthus camphoratus**
mohetula. *Cassia occidentalis.*
mohodiri. *Combretum apiculatum**
mohodiri tshipi. *Combretum* sp.*
mohoto. *Acacia giraffae**
mohubu. *Adenia glauca**
mohuditshane. *Rhus magalismontanum**
mohurokwana. *Rhigozum brevispinosum**
mohurukwana. *Rhoicissus* spp.*
mohutswa. *Grewia* spp.*
mohwahwa. *Strychnos* spp.*
moisatumo. *Commiphora* sp.*
mokabi. *Combretum* spp.*
mokaikai. *Bergia procumbens**
mokakata. *Sterculia* spp.*
mokala. *Acacia* spp.*
mokamanawe. *Bridelia mollis** and *Grewia* sp.*
mokamakama. *Themeda triandra*, grass.
mokapana. *Citrullus naudinianus*, cucurbit.
mokata. *Combretum transvaalense**
mokga. *Acacia arabica**
mokgalo. *Zizyphus* spp.*
mokgasi. *Cyperus longus* var. *tenuifolius* and *C. fastigiatus*, sedges used for making baskets.
mokgompata. *Grewia* spp.*
mokgwa. *Acacia* spp.*
mokgwara. *Euclea* spp.*
mokgware. *Olea africana**
mokha. *Acacia karroo**
mokholo. *Acacia haematoxylon**
mokgwelekgwele. Acacia spp.* and ? *Euclea* spp.*
mokhi. *Acacia gerrardi**
mokhuke. *Mundulea sericea**
moko. *Vangueria* spp.* and *Pygmaeothamnus zeyheri**
mokoakoa. *Gloriosa* spp. red flrd. lilies.
mokoba. *Acacia burkei**
mokobongo. *Albizzia versicolor**
mokoka. *Acacia cinerea** and *A. mellei**
mokokole. *Bridelia mollis**
mokokonana. do.
mokokwele. do.
mokokwenana. do.
mokole. *Pluchea leubnitziae**
mokomoto. *Commiphora edulis**
mokongwa. *Ricinodendron rautanenii**
mokoshi. *Bauhinia macrantha**
mokotokoto. *Acacia burkei**
mokosho. *Acacia albida**
moku. *Acacia robusta**
mokuba. *Terminalia sericea**
mokudjani. *Blumea gariepina** and *Pluchea leubnitziae**
mokuka. *Acacia ataxacantha**
mokukari. *Acacia pennata**
mokukutu. *Grewia occidentalis**
mokula. *Hyphaene* sp., palm.
mokhure. *Ricinus communis** and *Stramonium daturum*, Stinkblaar.
mokutsomo. *Diospyros mespiliformis**
mokwa. *Pterocarpus angolensis**
mokwele. *Vitex zeyheri**
mokwelekwele. *Acacia* spp.*
mokwerekwere. *Lachnopylis heterotricha**
molahatshe. *Parinari capense**
molalakgakga. *Albizzia* spp.*
molalaphage. *Schmidtia bulbosa*, grass.
molalatau. *Phaeoptilum spinosum**
molatsampya. *Jasminum fluminense**
molatswe. *Combretum holosericeum**
molekangwetsi. *Cenchrus ciliare, Enneapogon cenchroides* and *Pennisetum ciliare*, grasses.
molemogale. *Phragmites* sp., reed.
moloto. *Acacia dulcis**
molubare. *Combretum* spp.*
monambete. *Erythrina* sp.*
monato. *Burkea africana**
monepenepe. *Cassia abbreviata**
mongana. *Acacia detinens**
mongana khudu. *Acacia caffra**
mongololo. *Pouzolzia hypoleuca**
mongone. *Boscia albitrunca**
mongywani. *Mimosa pigra**
monnaokgang. *Myrothamnus flabellifolius**
monoga. *Albizzia anthelmintica**
monokane. *Heeria* spp.*
monomani. *Cassine* sp.*, *Pseudocassine transvaalense**
mononyane. *Scolopia mundii**
monqo. *Vernonia senegalensis**
montsiara. *Homalium rufescens**
montsho wa matlabele. *Euclea natalensis**

For names marked * see previous pages.

monwana. *Byrsocarpus orientalis**
monyaka. *Acacia detinens**
monyana. *Bidens schimperi.* "Black Jack".
monyelenyele. *Ochna* spp.*
monyena. *Faurea saligna**
monyonyana. *Canthium huillense**
monyunyana. *Vangueria* spp.* and *Taphiphyllum parvifolia**
mooka. *Acacia karroo**
mookana. do.
mooku. *Acacia uncinata**
mooluga. *Croton* spp.*
moomani. *Maerua schinzii**
moomelantsweng. *Ficus soldanella**
moopudu. *Mimusops* spp.* and *Canthium randii**
mootswana. *Lannea discolor**
mopanye. *Indigofera melanodenia**
mopennweeng. *Pappea capensis**
mophethe *Erythrina* sp.* and *Abrus precatorius**
mophani. *Colophosperma mopane**
mophutlu. *Cyperus fastigiatus*, sedge used for basket making.
mopipi. *Boscia rehmanniana**
mopiti. *Abrus precatorius**
mopororo. *Lonchocarpus capassa**
moporota. *Kigelia pinnata**
mopyane. *Lannea discolor**
morojwa. *Thespesia garkeana**
morala. *Gardenia spathulifolia**
moralo. *Acacia kirkii**
morama. *Bauhinia esculenta*, Kalahari plant yielding a rich bean.
moraro. *Acacia kirkii**
moratletlha. *Maerua schinzii**
moratletlhe. do.
moralwane. *Secamone viminale*, leafless laticiferous plant sprawling over other plants.
morebe. *Hemizygia elliotii**
more o mabele. *Acacia nigrescens**
more o masetlha. *Acacia xanthophloea**
morekhure. *Spirostachys africana**
moretlhwa. *Grewia flava**
morezwa. do.
morobe. *Ehretia* spp.*
morobe omtuna. *Indigofera melanodenia**
morobolo. *Steganotaenia aralacea**
moroka. *Commiphora* spp.*
morokolo. *Carissa bispinosa**
morotamadi. *Pterocarpus angolensis**
morotlhetle. *Scolopia mundii**
morotologa *Ximenia* spp.*
morotologana. do.
morotologakgomo do.
morotonoga. do.
moroto a piri. *Lycium* sp.* and *Pollichia campestris**
morukuru. *Spirostachys africana**
morula. *Sclerocarya caffra**
morolana. *Melia azedarach**
morolwana. do.
morumasetlha. *Acacia woodii**
morumbarunde. *Strychnos stuhlmannii**
morupapiri. *Rhus* spp.*
morutlha. *Strychnos* spp.*
morutlhari. *Acacia caffra**
morutlhatshana. do.
morutlhware. do.
morutse. *Vellozia retinervis.* rock plan with blue flrs., stems used for brushes. also *Cyperus compactus*, sedge.
morwa. *Sclerocarya caffra**
mosalaosi. *Melia azedarach**
mosapateke. *Grewia* spp.*
moseka. *Setaria sphacelata*, grass.
moseka omogolo. *Bothriochloa insculpta*, grass.
moseka omonyinye. *Digitaria eriantha*, grass.
moselatshwene. *Cenchrus ciliare*, grass.
moselesele. *Dichrostachys glomerata**
mosetlha. *Peltophorum africanum**
mosetlhatlou. *Mundulea sericea**
mosetsamute. *Markhamia* spp.*
mosetsanate. do.
mosetse. *Cussonia paniculata**
moshabela. *Rhus lancea**
moshaoka. *Acacia grandicornuta**
moshu. *Acacia litakunensis**, *A. spirocarpa** and *A. arabica**
mosiga wa poo. *Sphenostylis erecta*, leguminous herb.
mosiama. *Senecio laxiflorus*, herb said to be used for washing new-born babies.
mosimama. do.
mosigomabe. *Plumbago zeylanica** and *Psiadia arabica**
mosilabele. *Rhus lancea**
mosita nokana. *Asclepias fruticosa.**
mositlha ba tau. *Mundulea sericea**
mositsanate. *Markhamia* spp.*
mosito. *Iboza* sp.*
mositsane. *Elephantorrhiza* spp.
mositwane. *Asparagus* spp.
mosokophala. *Bolusanthus speciosus**
mosokatsebe. *Sansevieria* spp., Bow-string Hemp.
mosokelatsebe. do.
mosu. *Acacia litakunensis**, *A. spirocarpa** and *A. arabica**
mosukubyane. *Lippia asperifolia**
mosukudu. *Lantana salvifolia**
mosukujwani. do.
mosunyane. *Acacia litakunensis**
moswapeba. *Combretum* spp.
moswapedi. *Croton subgratissimus**
moswatyembe. *Canthium frangula**
motaba kgosi. *Acacia arabica**
motakola. *Euclea* spp.*
motawana. *Capparis tomentosa**
motatswa meno. *Polygonum setulosum.*

For names marked * see previous pages.

mothenyane. *Combretum* sp.*, *Baissea wulfhorstii** and *Schmidtia bulbosa*, grass.
motha. *Pseudocadia zambesiaca**
mothanthanyane. *Asparagus* spp.
mothata. *Pappea capensis**
mothono. *Gymnosporia buxifolia**
mothwakeya. *Baphia obovata**
mothlaba kulube. *Xanthium* sp., Cocklebur.
motlhaja. *Royena decidua**
motlhakola. *Euclea* spp.*
motlhakolana. do.
motlhakolwana. do.
motlhakutsane. *Maerua angloensis**
motlhakwa. *Chrysophyllum magalismontanum**
motlhatswa. do.
motlhatla ba dimo. *Chenopodium ambrosioides*, medicinal herb sometimes cultivated.
motlhatsa. *Ficus pretoriae**
motlhokomoti. *Entandrophragma caudatum**
motlhono. *Gymnosporia buxifolia**
motlhware. *Olea africana**
motlhopi. *Boscia albitrunca**
mothwane. *Vangueria infausta**
mothwanye. do.
motopi. *Boscia albitrunca**
motoroko. *Opuntia* spp., Prickly Pear, Spiny Cactus.
motsaudi. *Garcinia livingstonei**, *Guibourtia coleosperma**
motswarakgano. *Achyranthes aspera*, herb used with snuff.
motsha. *Acacia arabica**
motshakuba. *Andropogon eucomus*, grass.
motshanja. *Bauhinia* spp.*
motshedidi. *Hippocratea loesneriana**
motshi. *Acacia arabica**
motshotlho. *Rhus gueinzii**
motshwarakgane. *Albizzia versicolor**
motsintsila. *Berchemia discolor**
motsintsanate. *Markhamia acuminata**
motsinyate. *Markhamia acuminata**
motsontsinjani. *Grewia* spp.*
motsontswinjani. do.
motsotsobyane. *Grewia flavescens**
motswara tshukudu. *Catophractes alexandri**
motsweketsane. *Combretum mossambicense**
motswetswejane. *Grewia occidentalis**
motswiri. *Combretum imberbe**
motubane. *Dombeya rotundifolia**
motuu. *Grewia* spp.*
motlhwa. *Cynodon dactylon*, doub, couch or quick grass.
motwakija. *Bauhinia macrantha**
motwanye. *Vangueria* spp.*
motyiba kgomo. *Hibiscus subreniformis**
moumu. *Ficus* spp.*
moye. *Rhamnus zeyheri**
mpanda. *Pterocarpus rotundifolius**
mphaga. *Panicum maximum*, grass.
mpyeya. *Heteromorpha trifoliata**
mtamba. *Gardenia spathulifolia**
mtewa. *Grewia* spp.*
mubaba. *Piliostigma thonningii**
mubako. *Erythrophloeum africanum**
mubite. *Boscia corymbosa**
mubu. *Mimusops zeyheri**
mubungubungu. *Kigelia pinnata**
mubuyu. *Adansonia digitata**
mubwiti. *Croton megalobotrys**
muchare. *Ipomoea shirambensis**
muchenje. *Diospyros mespiliformis**
muchinga. *Popowia obovata**
muchingachinga. do.
muchisa. *Manilkara mochisia**
mudyangwe. *Capparis tomentosa**
mufamalowa. *Ostryoderris stuhlmannii**
mufufu. *Faurea saligna** and *Securidaca longipedunculata**
muhululuhulu. *Strychnos* spp.*
muhoruhoru. *Strychnos* spp.*
muhoruhorwana. do.
muingwe. *Antidesma venosum**
mukamba. *Afzelia quanzensis**
mukangola. *Combretum* sp.*
mukauke. *Schrebera* sp.*
mukelete. *Dalbergia melanoxylon**
mukena. *Croton zambesicus**
muketekete. *Zizyphus* spp.*
muketu. *Steganotaenia araliacea**
mukokobuyu. *Sterculia tomentosa**
mukololo. *Lonchocarpus* spp.*
mukona. *Acacia ataxacantha** and *A. stolonifera* var. *chobiensis**
mukondekonde. *Popowia obovata**
mukongotshi. *Albizzia versicolor**
mukonka. *Garcinia livingstonei**
mukononga. do.
mukonkotsi. *Erythrophloeum africanum**
mukulukuncha. *Acalypha glabrata**
mukumati. *Rhus commiphoroides**
mululwe. *Cassia abbreviata**
mulya. *Diplorhynchus angustifolia**
mulyanzovu. *Pterocarpus martinii**
mukunga. *Pseudolachnostylis* spp.*
mukunyabambi. do.
mukusi. *Baikiaea plurijuga**
mukutemu tembuze. *Gymnosporia senegalensis**
mukutinga. *Strophanthus kombe**
mukwa. *Pterocarpus angolensis**
mukwankusha. *Cassia abbreviata**
mulalakanga. *Albizzia* spp.*
mulenga. *Crossopteryx febrifuga**
mulila. *Cyperus compactus*, sedge.
mulombe. *Pterocarpus angolensis**
mulubana. *Combretum* sp.*
mulubare. do.

For names marked * see previous pages.

mulya. *Diplorrhynchus angustifolia**
mulyanzovu. *Pterocarpus martinii**
mumentsomentso. *Vangueria* spp.*
mumu. *Ficus* spp.
munego. *Thespesia garkeana**
munga. *Acacia albida**, *A. detinens** and *Albizzia versicolor**
munganga. *Zizyphus mucronata**
mungave. *Combretum transvaalense**
mungoma. *Diplorhynchus angustifolia**
mungongo. *Ricinodendron rautanenii**
munjongolo. *Diospyros batocana**
munkunda. *Acacia stolonifera**
munyinyinka. *Bridelia fischeri**
munzauri. *Guibourtia coleosperma**
mupanda. *Lonchocarpus* spp.*
mupatalwala. *Markhamia lanata**
muphane. *Colophosperma mopane**
mupombo. *Erythrophloeum africanum**
mupomena. *Entandrophragma caudatum**
mupondo. *Bauhinia* spp.*
mupondopondo. do.
mupopoja. *Sterculia tomentosa**
mupupu. *Combretum coriaceum**
muravi. *Gardenia spathulifolia**
murengambo. *Acacia dulcis**
murowanyero. *Gymnosporia buxifolia**
murumasele. *Acacia woodii**
murura. *Acacia* sp. with white spicate inflor.
musamba. *Lannea discolor**
musane. *Syzygium guineense**
musekese. *Piliostigma thonningii**
musheshe. *Burkea africana**
mushitondo. *Euclea* spp.*
mushosho. *Terminalia sericea**
musika tambo. *Royena* spp.*
musikiri. *Trichilia emetica**
musimba. *Dialium simii**
musinsi. *Combretum zeyheri**
musiru. *Peltophorum africanum**
musokanzebe. *Sansevieria cylindrica*, Bowstring Hemp.
musokola. *Euclea lanceolata**
musukula. do.
mususu. *Terminalia sericea**
muswabenga. *Acacia woodii**
muswatshembe. *Canthium frangula**
mutemi. *Strychnos innocua**
mutenena. *Abrus precatorius**
mutondo. *Isoberlinia globiflora**
mutoya. *Antidesma venosum**
mutu. *Strychnos* spp.*
mutulu. *? Cordia pilosissimus**
mutumbulwa. *Flacourtia ramontchi** and *Sida rhombifolia**
mutupa. *Boscia* spp.*
mutumutya. *Isoberlinia globiflora**
mutusu. *Fockea schinzii**
muvimba. *Combretum imberbe**
muvitshi. *Royena* spp.*
muvombo. *Brachystegia boehmii**
muyevi. *Peltophorum africanum**
muuwa. *Pterocarpus angolensis**
muxuwa. *Antidesma venosum**
muyatu. *Baissea wulfhorstii**
muyimbili. *Strychnos spinosa**
muzamalowa. *Ostryoderris stuhlmannii**
muzinzila. *Berchemia discolor**
muzumina. *Kirkia acuminata**
muzungula. *Kigelia pinnata**
muzwamalowa. *Ostryoderris stuhlmanii**
muzwe. *Ochna pulchra**
mwahata. *Lonchocarpus nelsii**
mwande. *Afzelia quanzensis**
mwangarara. *Monotes glabra** and *Paropsia brazziana**
mwangula. *Pterocarpus angolensis**
mwanzabalo. *Pteleopsis myrtifolia**
mwanzabelo. do.
mwarasupe. *Solanum* spp.*, *Waltheria americana** and *Cordia ovalis**
mwembera. *Cleome hirta*, purple flrd herb.
mwimbili. *Strychnos spinosa**
mwithimudiso. *Cotyledon orbiculata*, dried stem used in desert as a "sip stick".

N

nakgwa. *Hydnora* sp., large edible tuber of Delta Country of Ngamiland; above-ground shoot seldom seen.
namba. *Elephantorrhiza burkei**
nanyama. *Fockea schinzii**
ngagula. *Euclea* spp.*
nganganga. *Erythroxylum* sp. *
ngogo. *Euphorbia* sp.*
ngwenyane. *Pouzolzia hypoleuca**
nimpipi. *Boscia kalachariensis**
nkgone. *Elaeodendron capense**
nkulambela. *Pterocarpus angolensis**
nkumbakumba. *Bridelia mollis**
nlungu. *Heeria salicina**
nsasane. *Rhus gueinzii**
nqanda mshoro. See onkatiramoshoro.
nsekesa. *Piliostigma thonningii**
nshashanyana. *Cassia abbreviata**
nsibi. *Guibortia coleosperma**
nsukungaphala. *Bolusanthus speciosus**
nungwani. *Mimosa pigra**
nyuwi. *Hippocratea obtusifolia**
nzani. *Hesperethusa villosa**

O

onkatiramoshoro. *Orthanthera brownianum*, Useful sand-fixer of Chobe and Ngamiland.
oshi. *Guibourtia coleosperma**

P

palamela. (= climber) *Loranthus* spp.* and *Ansellia* sp., an epiphytic orchid.
pelobothuku. *Geigeria passerinoides*, yell-flrd composite.

For names marked * see previous pages.

phalwane. *Rhynchelytrum roseum*, grass.
phepheng. *Gomphostigma scoparoides*, a poisonous plant.
pheho. *Lannea edulis**
pherephere. *Abrus precatorius**
pheto. *Pretrea zanguebarica*, prostrate herb, frts shield-shaped with 2 formidable spines.
phuka. *Paspalum scrobiculatum*, grass.
pilibutuku. *Mimosa pigra**
poke. *Urochloa helopus*, good pasture grass.
pokudza. *Croton megalobotrys**

R

ramagola. *Acanthospermum xanthoides*, Prostrate Starbur.
rathatha. *Eragrostis lehmanniana*, *Dactylotenium aegyptiacum*, grasses.
rongwe. *Antidesma venosum**
rotho. *Gynandropsis pentaphylla*, a food plant.

S

sapolanaga. *Hesperethusa villosa**
sebete. *Cassia obovata*, yell.-flrd herb.
segopa. *Piliostigma thonningii**
segope. *Dalechampia capensis**
segolobe. *Bulbostylis coleotriche*
seheho. *Acalypha petiolaris*, herb.
sentsho. *Baphia obovata**
seragola. *Carissa bispinosa**
serethe. *Heteromorpha trifoliata**
seretwane. *Waltheria americana**
seroka. *Comniphora* spp.*
serokana. do.
serokolo. *Carissa bispinosa**
sesetu. *Gossypium* spp.*
seswa gadi. *Jatropha zeyheri*, liquor from tuber used for tanning.
setaba batsumi. *Blepharis serrulata*, herb.
setshe. *Acacia stolonifera**
setlhangsweng. *Gymnema sylvestre**
siboana. *Sesamothamnus lugardi**
sifonkola. *Cassia abbreviata**
sihokgwe. *Gloriosa* spp. Red flrd lillies.
siki. *Acacia stolonifera**
sikitsani wa malapo. *Erogrostis plana*, grass.
siklaula. *Moraea* sp., herb.
simai. *Antidesma venosum**
simboba. *Carissa bispinosa**
sinzi. *Acacia arabica**
sipodisi. *Acanthospermum xanthoides*, Prostrate Starbur.
sipumbula matako. *Albizzia rhodesica**
sisira. *Lasiosiphon kraussianus*, a fibre plant.
sitha ba kulubi. *Xanthium spinosum*, Cocklebur.
sitlhotswa meno. *Hermbstaedtia elegans*, herb.
sitasutsau. *Lycium tenue**
sitshi. *Acacia stolonifera**
sitsi. do.
sixocomo. see nakgwa.
somasekgwa. *Lasiosiphon burchellii*, fibre plant.
sulu. *Gardenia spathulifolia**
sunde. *Baphia obovata**

T

tati?. *Ptaeroxylon obliquum**
tedu tsa banna. *Triumfetta pentandra*, herb.
thepe. *Amarantus paniculatus*, a "spinach".
tobega. *Erythrococca menyhartii**
togo tswau. *Aerva leucrura**
torungwe. *Eleusine indica*, grass.
tota. *Panicum coloratum*, grass.
tothothwari. *Cyperus longus* var. *tenuifolius*, sedge used for basket making.
tsaro. *Phoenix reclinata*, Wild Date Palm.
tsaudi. *Guibortia coleosperma**
ntshetsheni. *Zizyphus mucronata**
tshikabanna. *Pavetta zeyheri**
tshika di thate. *Lasiosiphon kraussianus*, fibre plant.
tshikitshane. *Eragrostis gangetica*, grass.
tshipi ya magala. *Sphedamnocarpus pruriens**
tshiriza. *Grewia* spp.*
tshuke. *Vellozia retinervis*, blue flrd rock plant, stem used as brush.
tsingitsi. *Combretum apiculatum**
tsobe. *Schmidtia bulbosa*, grass.
tswang. *Digitaria eriantha*, grass.
tswei. *Nymphaea* spp. Water Lily.
tuu. *Suaeda fruiticosa**
twee. *Cissus lonicerifolius*, herb.

U

ubulimbu. *Loranthus* spp.*
uchundwe. *Albizzia anthelmintica**
ukondo. *Hibiscus* sp., herb.
ukusi. *Baikiaea plurijuga**
umi. *Strychnos* spp.*
ungandu. *Acacia nigrescens**
ununza. *Erythrophloeum africanum**
upanda. *Lonchocarpus capassa**
upupa. *Combretum coriaceum**
utunda. *Diospyros mespiliformis**
usimba. *Dialium simii**
utshundwe. *Albizzia anthelmintica**

Z

zwezwe. *Strophanthus kombe**

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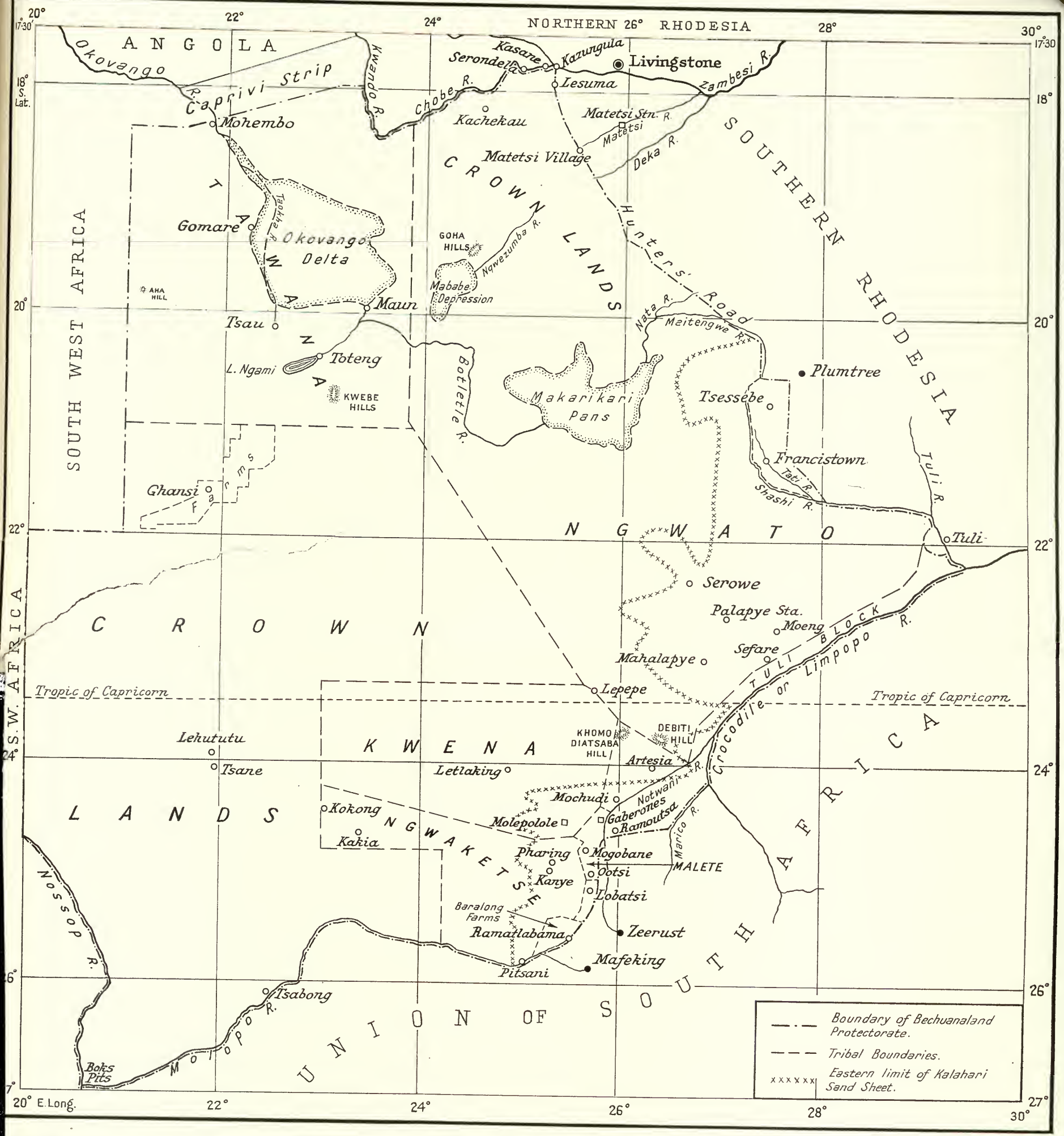

R. S. Pinker, Fish Hoek. C.P.

BECHUANALAND PROTECTORATE

50 40 30 20 10 0 100 200 300 400

Scale 1 Inch - 50 Miles

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NEW AND HITHERTO IMPERFECTLY KNOWN SPECIES OF SOUTH AFRICAN RESTIONACEAE.

By N. S. Pillans.

This paper contains descriptions of 24 new species based on material in the Bolus Herbarium, University of Cape Town. Previous supplements to my monograph of African *Restionaceae*, published in 1928, are in Volumes XXIX and XXX of the *Transactions of the Royal Society of South Africa*. Since 1928 more than 70 new species have been discovered, but many, represented by inadequate material, have not been published. Two of the new species now published possess characters which hitherto have not been known in the genera to which they belong. *Chondropetalum insigne* has fruit which does not dehisce before being shed. The fruit of all other species in that genus dehisces while on the plant. The other species with an exceptional character is *Leptocarpus monostylus* which has a solitary style, in contrast to three styles which has been a constant character in the genus. This species is quite unsuitable for inclusion in the unique 1-styled African genus *Thamnochortus* or in Australian genera with that character.

Restio *Linn.*

R. alticolus sp. nov.; culmis teretibus leviter scabridis rigidis ramosissimis; vaginis lanceolato-oblongis obtusissimis subulato-mucronatis ultra medium membranaceis deciduis; spiculis masculis oblongis terminalibus; bracteis ovato-lanceolatis obtusis subulato-mucronatis, marginibus ultra medium late membranaceis; perianthio elliptico-oblongo; segmentis lanceolatis, lateralibus villoso-carinatis; spiculis femineis terminalibus; bracteis ut in mare; perianthio oblongo-lanceolato; segmentis lanceolatis, exterioribus lateralibus villoso-carinatis, interioribus membranaceis; ovario oblique elliptico dorse compresso uniloculari; stylis tribus.

Stems about 50 cm. high, terete, slightly rough, minutely grey-speckled, rigidly wiry, much branched. Sheaths 1·3—2 cm. long, lanceolate-oblong, very obtuse, subulate-mucronate, coriaceous, conspicuously nerved, closely convolute; the upper margin membranous, at first brown, deciduous. Male spikelets 1·2—1·4 cm. long, oblong, cuneate at the base, many-flowered, terminal and solitary. Spathe sheath-like. Bracts 0·8—1 cm. long, ovate-lanceolate obtuse, subulate-mucronate, coriaceous, widely membranous at the upper margin, light brown, with a bronze sheen, dark brown across the base of the mucro, loosely imbricate. Perianth 4·5 mm. long, elliptic-oblong, stipitate, hidden by the bract: outer segments oblong-lanceolate, cartilaginous; the lateral navicular, acute, villous-carinate; the anterior obtuse, glabrous; inner segments shorter, lanceolate, obtuse, membranous. Female spikelets usually 1·5 cm. long, solitary, resembling the male. Bracts 1—1·3 cm. long, otherwise as in the male. Perianth 6 mm. long, oblong-lanceolate, hidden by the bract, stipitate: outer segments lanceolate, cartilaginous; the lateral navicular, acute, villous-carinate; the anterior obtuse, glabrous: inner segments shorter, lanceolate, obtuse, membranous. Ovary obliquely elliptic, dorsally compressed, 1-chambered. Styles 3, 2 adjacent, 1 apart.

Cape Province.—Paarl Div.: Wemmershoek Mts., Winterberg, *Esterhuysen* 9648♂.—Worcester Div.: Slanghoek Mts., Witteberg, gully on south side, *Esterhuysen* 9502♂ and ♀ (type, in Bolus Herb.); Lower Wellington Sneeuwkop, *Esterhuysen* 12441♂.

The affinity is with *R. sarcocladus* Mast. from which it is distinguished by stouter and more branched stems, by the membranous and deciduous upper margins of the bracts, by the larger perianth of the female, by the lateral segments being equal in size and shape, and by the different arrangement of the styles.

R. cascadensis sp. nov.; culmis gracilibus valde compressis ramosis; vaginis ovato-lanceolatis acutis obtuse mucronatis compressis; spiculis masculis obcuneatis laxe 4—6 floris; bracteis lanceolatis acutis; perianthio elliptico glabro; segmentis exterioribus oblanceolato-oblongis, lateralibus navicularibus; spiculis femineis 1 vel 2 obcuneatis laxe 1—2-floris; bracteis lanceolatis chartaceis; perianthio stipitato chartaceo; segmentis oblongo-lanceolatis, exterioribus puberulo-carinatis; ovario rotundo biloculari.

Stems usually 6—9 cm. long, slender, much compressed, 1—1·5 mm. wide, often thickened at the margin, almost smooth, moderately or much branched. Sheaths mostly 1—1·5 cm. long, ovate-lanceolate, acute, laterally compressed, chartaceous at the margins, with a prominent dorsal nerve excurrent in a laterally compressed blunt mucro 2—3 mm. long. Male spike'ets 4—6 mm. long, obcuneate, very laxly 4—6-flowered,

many in a lax spicate cyme usually 2·5—4 cm. long. Bracts mostly 0·4—1 cm. long, lanceolate, acute, chartaceous. Perianth 2·5—2·75 mm. long, stipitate, elliptic, glabrous, exposed: outer segments oblanceolate-oblong, acute; the lateral navicular: inner segments slightly shorter, oblong, obtuse. Female spikelets about 1 cm. long, obcuneate, laxly 1- or 2-flowered, solitary or in pairs. Spathe sheath-like. Bracts 6—7 mm. long, lanceolate, mucronate, chartaceous. Perianth 3·5 mm. long, chartaceous, stipitate: outer segments oblong-lanceolate, acute; the lateral navicular, puberulous on the keel: inner segments slightly shorter, oblong-lanceolate, obtuse. Ovary rotund, 2-chambered. Styles 3, free or 2 united at the base. Fruit 1-seeded. Seeds rotund, with slightly undulating rows of grey tubercles.

Cape Province.—Caledon Div.: Betty's Bay, Cascades, steep moist rocky slopes, *Parker* 4499♂ and ♀, 4516♂ and ♀ (type, in Bolus Herb.).

The affinity is with *R. subcompressus* Pillans from which it is distinguished by much wider more compressed stems, by a much larger mucro on the leaf-sheaths, by a greater number of flowers in the female spikelets, and by the free styles.

R. confusus sp. nov.; culmis simplicibus teretibus gracilibus; vaginis lineari-oblongis obtusissimis mucronatis arte convolutis, apice membranaceis; spiculis masculis obovatis 2—4 in cymam spicatam dispositis; bracteis ovatis obtusis coriaceis, marginibus inferioribus membranaceis; perianthio apice exserto; segmentis oblongo-lanceolatis, exterioribus lateralibus navicularibus acutis glabris; spiculis femineis ut in mare 1—5 floris; bracteis ut in mare; perianthio trigono glabro ultra medium exserto; segmentis exterioribus navicularibus saepe apice sensim carinatis; segmentis interioribus late ovatis; ovario triquetro triloculari; stylis tribus liberis vel breviter connatis.

Stems usually 30—50 cm. high, tufted, unbranched, terete, very slender, slightly punctate, often with a somewhat glistening sheen. Leaf-sheaths mostly basal, usually 1·5—2 cm. long, closely convolute, linear-oblong, very obtuse, cartilaginous, membranous at the apex, with a long, rarely short, mucro. Male spikelets 6—7 mm. long, obovate or subrotund, usually 2—4 in a spicate cyme. Spathe sheath-like but shorter. Bracts 4 mm. long, ovate, obtuse, coriaceous, membranous at the lower margins, chestnut-brown. Perianth 3·5 mm. long, with the apex exserted beyond the bract: outer segments oblong-lanceolate, cartilaginous; the lateral navicular, acute, glabrous; the anterior obtuse; inner segments slightly shorter, lanceolate, obtuse, membranous. Female spikelets resembling the male, 1—5-flowered. Spathe and bracts as in the male. Perianth 2·75—3 mm. long, trigonous, with part of the upper half

distinctly exserted, mostly during the fruiting period: outer segments oblong-lanceolate, acute, navicular, the lateral sometimes more deeply keeled near the apex than elsewhere, glabrous, minutely toothed or setulose near the apex: inner segments slightly shorter, widely ovate, subacute, cartilaginous. Ovary triquetrous, with 3 fertile chambers. Styles 3, adjacent or shortly united.

Cape Province.—Caledon Div.: near Kogelberg, *Stokoe* in Bolus Herb. 17703♂ and ♀; Kogelberg, *Esterhuysen* 10013♂; above Sir Lowry's Pass, *Parker* 4607♂, 4608♀; between Viljoen's Pass and Somerset Sneeuwkop, *Stokoe* 3008♂; east side of Landdrost Kop, *Esterhuysen* 3577♀; Babylons Tower, near Diep Gat, *Leslie Guthrie* in Bolus Herb. 16185♂.—Clanwilliam Div.: Cederberg Peak, marsh, *Esterhuysen* 7590♀; Uitkyk Peak, marsh, *Esterhuysen* 7374♀; Krakadouw Poort, marsh, *Esterhuysen* 12245♂ and ♀; Engelman's Kloof, *Esterhuysen* 8077a♀.—Paarl Div.: French Hoek Pass, *Neebold* in Bolus Herb. 24866♀; Seven Sisters, *Stokoe* in Bolus Herb. 24867♂ and ♀.—Worcester Div.: Fonteintjiesberg, Disa Dell, streamside, *Esterhuysen* 8779♂ and ♀; Waaihoek, marsh, *Esterhuysen* 8369♂ and ♀ (type, in Bolus Herb.); Mount Superior, *Esterhuysen* 8978♂ and ♀; Hex River Mts., Milner Peak, streamside, *Esterhuysen* 8713♂ and ♀.

The affinity is with *R. miser* Kunth and *R. pedicellatus* Mast. which it closely resembles in superficial appearance. It differs from the former by having female spikelets normally more than 1-flowered, and by the female flowers having the upper half of the perianth exserted beyond the bract. It differs from the latter by the spikelets being less tapered at the base, by the distinctly obtuse fertile bracts, and by the partly exserted female flowers. The form with the outer lateral perianth segments of the female flowers having an unusually prominent keel is only recorded from the Caledon Division.

R. fusiformis sp. nov.; culmis teretibus gracilibus minute tuberculatis sparse ramosis; vaginis late oblongis acutis coriaceis arte convolutis, marginibus superioribus membranaceis deciduis; spiculis femineis fusiformibus solitariis vel geminatis; bracteis subquadratis acutis coriaceis ultra medium membranaceis; perianthio sensim elliptico; segmentis lanceolatis acutis cartilagineis, exterioribus lateralibus navicularibus ultra medium alatis; segmentis interioribus paulum brevioribus; ovario rotundato biloculari; stylis tribus liberis.

Stems 40—50 cm. high, terete, slender, wrinkled and minutely tubercled, sparsely branched, tufted. Sheaths mostly 0·5—1 cm. long, widely oblong, widened in the upper half, acute, coriaceous, membranous and deciduous in the upper half, closely convolute. Female spikelets 5—8 mm. long, fusiform, solitary and terminal or rarely 2 in a spicate

cyme. Spathe 6 mm. long, subquadrate, sheath-like. Bracts 6—7 mm. long, closely imbricate, subquadrate, narrowed to an acute apex, apiculate, coriaceous, straw-coloured, with the tapered part membranous and brown. Perianth 4·5 mm. long, on a long stipe, elliptic, partly exposed at the side of the bract: segments lanceolate, acute, cartilaginous; the outer lateral navicular, with a partly lacerated wing on the upper half of the keel: inner segments slightly shorter. Ovary rotund, 2-chambered. Styles 3, adjacent.

Cape Province.—Caledon Div.: Kogelberg Area, *Stokoe* 2595a♀ (in Bolus Herb.).

The affinity is with *R. filiformis* Poir. from which it is distinguished by the colouring of the bracts, and by the winged outer lateral perianth segments of the female flower.

R. involutus sp. nov.; culmis teretibus tuberculatis ramosissimis; vaginis oblongis obtusissimis mucronatis tuberculatis arte convolutis, marginibus superioribus membranaceis; spiculis masculis obovatis 1—3 in cymam spicatam dispositis; bracteis ovato-oblongis obtusis, marginibus ultra medium membranaceis; perianthio elliptico; segmentis exterioribus cartilagineis, lateralibus villoso-carinatis; segmentis interioribus sensim brevioribus; spiculis femineis solitariis oblongis multifloris; bracteis oblongis obtusis laxe imbricatis, marginibus superioribus membranaceis; perianthio ovato cartilagineo stipitato; segmentis exterioribus lanceolatis villoso-carinatis; ovario elliptico biloculari; stylis tribus liberis.

Stems about 50—60 cm. high, terete, closely tubercled, stout below the middle, slender-wiry and much branched above. Sheaths mostly about 1 cm. long, oblong, widely rounded at the apex, with a stout blunt mucro, coriaceous, widely membranous at the upper margin, tubercled, closely convolute. Male spikelets mostly 0·8—1·2 cm. long, obovate, usually 1—3 in a spicate cyme. Spathe sheath-like. Bracts 6—7 mm. long, ovate-oblong, obtuse, coriaceous, membranous at the upper margins, red-brown, loosely arranged; those at the base often stoutly mucronate. Perianth 3·5—4 mm. long, partly exposed, elliptic: outer segments cartilaginous; the lateral oblong, acute, navicular, villous-carinate; the anterior oblong-lanceolate, obtuse, sparsely villous on the dorsal face: inner segments distinctly shorter, ovate-lanceolate, truncate, membranous. Female spikelets 1·3—1·5 cm. long, oblong, cuneate at the base, many-flowered, solitary. Spathe sheath-like. Bracts about 1 cm. long, oblong, obtuse, coriaceous, membranous at the upper margins, red-brown, speckled, loosely arranged; the lower with a stout mucro; the upper mucronate, somewhat involute at the upper margins. Perianth 4·5—5 mm. long, ovate, cartilaginous, on a stout villous stipe: outer lateral

segments lanceolate, acute, navicular, villous-carinate; the anterior ovate-lanceolate, obtuse, sparsely villous on the upper half of the dorsal face: inner segments slightly shorter; the lateral ovate-lanceolate, acute; the adaxial lanceolate-ovate, obtuse. Ovary elliptic, 2-chambered. Styles 3, adjacent, connate at the base.

Cape Province.—Caledon Div.: Landdrost Kop, *Stokoe* 2844♂, 2858♀ (type, in Bolus Herb.); Somerset Sneeuwkop, *Stokoe* 54028♂.

The affinity is with *R. scaber* Mast., differing in the female with the upper bracts being distinctly obtuse, having somewhat involute margins, and being without a hair-tipped mucro; also differing with wider inner perianth segments, and with the styles being adjacent.

R. anceps comb. nov. [*R. anceps* Burchell ms.] **Hypolaena anceps** *Mast. in Journ. Linn. Soc.* x, 267 (1868)! *in DC. Monog. Phan.* i, 373 (1878); *Durand & Schinz, Consp. Fl. Afr.* v, 521 (1895); *Mast. in Harv. & Sond. Fl. Cap.* vii, 131 (1897); *Pillans in Trans. Roy. Soc. S. Afr.* xvi, 397 (1928). **Calorophus anceps** *O. Kuntze, Rev. Gen. Pl.* pars. ii, p. 747 (1891). **Restio aspericaulis** *Pillans in Trans. Roy. Soc. S. Afr.* xxx. 245 (1945).

The following records are additional to those already published:—

Cape Province—Swellendam Div.: Lemoenshoek Peak, south slopes, streamside, *Esterhuysen* 10495♂ and ♀; near Heidelberg, Langebergen, south-east slopes, swamp, *Esterhuysen* 1441♂.—Uniondale Div.: Joubertina, Outeniquas, swamp, *Esterhuysen* 10641♀, 10683♂.

Chondropetalum *Rottb.*

C. insigne sp. nov.; culmis simplicibus rigidis; vaginis lanceolato-oblongis acutis apiculatis coriaceis laxe convolutis deciduis; spiculis masculis ovatis in cymas paniculatas dispositis; bracteis lanceolatis attenuatis membranaceis; perianthio oblongo-ovato coriaceo, ultra medium exserto; segmentis exterioribus ovatis cuspidatis, lateralibus leviter carinatis; segmentis interioribus longioribus oblongo-ovatis apiculatis; inflorescentia feminea ut in mare; bracteis lanceolatis attenuatis; segmentis perianthiis ut in mare; ovario obovato trigono triloculari, stylis tribus liberis; fructu uniloculari.

Stems 18 dm. high, 6 mm. thick at the base, 1·5—3 mm. thick at the base of the inflorescence, unbranched. Sheaths mostly 6—7 cm. long, lanceolate-oblong, acute, apiculate, coriaceous, conspicuously nerved, loosely convolute, caducous. Male inflorescence 1—2·5 dm. long, narrowly oblong and lax or, more often, oblong and dense, tapering towards the apex, paniculate-cymose. Spathes mostly 6—8 cm. long, lanceolate, acute, apiculate, chartaceous, conspicuously nerved, expanded, persisting during the flowering period. Spikelets mostly 1 cm. long, ovate, dense.

Bracts 0·6—1 cm. long, lanceolate, long-attenuate, membranous, pale. Perianth 5 mm. long oblong-ovate, coriaceous, distinctly pedicellate, much exposed: outer segments ovate, acute, cuspidate; the lateral somewhat keeled: inner segments oblong-ovate, acute, apiculate, much exceeding the outer, curved towards the axis of the inflorescence. Female inflorescence resembling the male. Spathes as in the male. Spikelets and bracts as in the male. Perianth 6 mm. long, oblong-ovate, attenuate, trigonous, coriaceous, chestnut-brown, distinctly pedicellate: outer segments ovate attenuate, cuspidate; the lateral keeled: inner segments ovate, attenuate, apiculate, distinctly longer. Ovary obovate, trigonous, 3-chambered, with 1 ovule developing. Styles 3, separated. Fruit 3·5 mm. long, narrowly elliptic, trigonous, black, with a tightly closed suture, from base to apex, on each angle, indehiscent before being shed.

Cape Province.—Ceres Div.: Cold Bokkeveld, Hexberg, swamp on plateau, *Esterhuysen* 18427♀.—Worcester Div.: Matroosberg, west slopes, *Esterhuysen* 14200♂ and ♀; Waaihoek Mts., Mount Superior, swamp, *Esterhuysen* 18198♂ and ♀ (type, in Bolus Herb.).

The affinity is with *C. nitidum* Pillans but it is easily distinguished by being very much larger in all respects. A remarkable character is in the fruit not dehiscing before being shed.

C. albo-aristatum sp. nov.; culmis rugulosis simplicibus; vaginis expansis oblongo-lanceolatis apiculatis caducis; inflorescentia mascula dense paniculato-cymosa; spiculis obovatis; bracteis lanceolatis attenuatis aristatis late membranaceis; perianthio ovato; segmentis lanceolatis acutis; inflorescentia feminea ut in mare; perianthio anguste ovato; segmentis lanceolatis coriaceis; exterioribus navicularibus; ovario trigono triloculari; stylis tribus.

Stems about 60 cm. high, 1·5—2 mm. thick at the middle, simple wiry, rugulose. Sheaths about 3 cm. long, oblong-lanceolate, acute, apiculate, coriaceous, light brown, expanded, mostly caducous during the flowering period. Male inflorescence usually 4—8 cm. long, paniculate-cymose, dense. Spathes 2—2·5 cm. long, lanceolate, acute, pale brown, expanded and persisting during the flowering period. Spikelets 0·6—1·5 cm. long, obovate, on short simple or branched stalks, several together at a node. Bracts 0·9—1 cm. long, erect-spreading, lanceolate, attenuate, terminating in a pale awn, cartilaginous, widely membranous and pale at the margins. Perianth 3·5 mm. long, stipitate, exposed at one side of the bract, ovate: outer segments 2—2·5 mm. long, lanceolate, acute, minutely apiculate, coriaceous, membranous at the margins; the lateral navicular, distinctly keeled: inner segments lanceolate, acute, rounded on the back, coriaceous, membranous at the margins. Female inflorescence

and bracts as in the male. Perianth 4 mm. long, stipitate, narrowly ovate: outer segments 2·5 mm. long, lanceolate, apiculate, coriaceous, membranous at the margins; the lateral navicular, keeled: inner segments lanceolate, apiculate, rounded on the back, coriaceous, membranous at the margins. Ovary sessile, elliptic, trigonous, with 1 fertile chamber. Styles 3, separated. Fruit dehiscing at each angle, but the solitary seed appearing at the dorsal angle.

Cape Province.—Clanwilliam Div.: Cederberg, peak south of Sneeuwkop, streamside, *Esterhuysen* 7545♀; Krakadouwsberg, *Esterhuysen* 7514♂ and ♀, 8046♂ and ♀, 12101♂; North Cederberg, peak at Koupoort, marshy slope, *Esterhuysen* 12158♂ and ♀ (type, in Bolus Herb.).

The affinity is with *C. nitidum* Pillans from which it differs with much smaller more compressed female flowers with a wing-like keel on the outer lateral segments, and in the ovary having only 1 fertile chamber.

Leptocarpus *R. Br.*

L. monostylis sp. nov.; culmis simplicibus gracilibus tuberculatis; vaginis arte convolutis oblongo-lanceolatis mucronatis conspicue nervosis, ultra medium membranaceis; spiculis masculis anguste ovatis 2—4 in cymam spicatam dispositis; bracteis arte imbricatis rotundatis obtusis cartilagineis; perianthio obovato glabro, apice exserto: segmentis oblanceolatis membranaceis glabris, exterioribus lateralibus navicularibus conspicue carinatis; spiculis femineis ut in mare; perianthio ut in mare; ovario oblanceolato-oblongo valde compresso; stylo sublaterali.

Stems 30—40 cm. high, unbranched, tufted, slender-wiry, coarsely tubercled. Sheaths mostly 1·5—2 cm. long, closely convolute, oblong-lanceolate, mucronate, scabrid on the lower half, conspicuously nerved, membranous and deciduous in the upper half. Male spikelets mostly 8 mm. long, narrowly ovate, 2—4 in a spicate cyme. Spathe sheathlike, ovate. Bracts 4—4·5 mm. long, rotund, obtuse, deeply concave, cartilaginous, chestnut-brown at the upper margin, closely imbricate. Perianth 4—4·5 mm. long, obovate, much compressed, glabrous, partly exserted at the apex; outer segments narrowly oblanceolate; the lateral acute, navicular, with a prominent keel, cartilaginous; the anterior obtuse, membranous: inner segments slightly shorter, oblanceolate, obtuse, membranous. Female spikelets resembling the male, 1 or 2 together. Spathe, bracts and perianth segments as in the male. Ovary oblanceolate-oblong, much compressed, slightly swollen at the margins, with a solitary style arising almost at the top of one edge.

Cape Province.—Riversdale Div.: Langebergen, south slopes near Riversdale, *Esterhuysen* 16993 (in Bolus Herb.).

The affinity is with *L. Esterhuyseniae* Pillans from which it is dis-

tinguished by slenderer more coarsely tubercled stems, more closely clasping and more widely separated leaf-sheaths, and by the solitary style. This is the first recorded 1-styled *Leptocarpus* in Africa. Although the other characters are those essential in that genus, the solitary style may indicate a very close relationship with Restio.

L. Parkeri sp. nov.; culmis teretibus leviter scabridis, ultra medium ramosis; vaginis arte convolutis lineari-lanceolatis obtusis mucronatis chartaceis; spiculis masculis lineari-oblongis laxe 4—6-floris in cymam paniculatam dispositis; bracteis lanceolatis acutis chartaceis; perianthio conspicue stipitato glabro; segmentis exterioribus lateralibus oblongis obtusis subcarinatis chartaceis; segmentis interioribus elliptico-oblongis membranaceis; inflorescentia feminea ut in mare 4—6-floris; bracteis ut in mare; perianthio glabro; segmentis oblongo-lanceolatis vel lanceolato-oblongis obtusis, exterioribus lateralibus navicularibus; ovario elliptico dorse compresso, margine crasso; stylis tribus liberis; seminibus ellipticis trigonis laevibus.

Stems 30—40 cm. high, 1·5—2 mm. thick at the middle, clustered, terete, usually branched from the middle upwards, with slightly raised grey specks. Sheaths mostly 2·5—3·5 cm. long, closely convolute, linear-lanceolate, obtuse, papery, brown, with a long slender mucro arising behind the apex. Male inflorescence a much branched panicle 5—10 cm. long. Spikelets 6—10 mm. long, linear-oblong, laxly 4—6-flowered. Spathes sheath-like, with a long awn-like mucro. Bracts 4—6 mm. long, lanceolate, acute, papery, distinctly decurrent. Perianth 2·5 mm. long, stipitate, somewhat 3-sided, glabrous: outer segments oblong, obtuse, papery: the lateral subcarinate; the inner elliptic-oblong, obtuse membranous. Female inflorescence resembling the male, 4—6-flowered. Spathe and bracts as in the male. Perianth 2·5 mm. long, stoutly stipitate, dorsally compressed, glabrous: outer segments papery, lanceolate-oblong, obtuse; one of the lateral slightly larger than the other, and more distinctly navicular: inner segments slightly shorter, oblong-lanceolate, toothed at the obtuse apex, membranous. Ovary elliptic, dorsally compressed, 1-chambered, thickened at the angles. Styles 3, adjacent, arising upon a stylopodium. Seeds narrowly elliptic, trigonous, smooth.

Cape Province.—Caledon Div.: near Pringle Bay, *Parker* 4495♂, 4496♀, 4522♀ (type, in Bolus Herb.), 4523♂ (type, in Bolus Herb.); above Rooi Els, *Parker* 4695♂ and ♀.

The plume-like panicle distinguishes this species from all others in the genus. The flowers, however, have no very distinctive character. Named in honour of Mr. R. N. Parker, who, in the course of many years, intensively studied the flora of the Somerset West Area.

Thamnochortus *Berg.*

T. Lewisiae sp. nov.; culmis laevibus simplicibus vel ramosis; vaginis anguste oblongo-lanceolatis attenuatis, marginibus late pallido-membranaceis; spiculis masculis ellipticis vel obovatis; bracteis lanceolatis acutissimis, marginibus anguste membranaceis; perianthio late elliptico sub-membranaceo; segmentis exterioribus lateralibus late carinatis; spiculis femineis 3-5 ellipticis; bracteis late imbricatis lineari-lanceolatis acuminatis; perianthio cartilagineo; segmentis exterioribus linearibus subacutis, lateralibus late carinatis; segmentis interioribus sensim brevioribus elliptico-oblongis obtusis; ovario elliptico scabrido.

Stems about 40 cm. high, wiry, smooth, producing barren branchlets. Sheaths 3·5—4 cm. long, closely convolute in the lower part, narrowly oblong-lanceolate, attenuate, mucronate, coriaceous, widely pale-membranous at the margins, striate. Male spikelets 1—1·5 cm. long, elliptic or obovate, cernuous, many in a panicled cyme. Bracts 7—8 mm. long, loosely imbricate, lanceolate, sharply acute, cartilaginous, narrowly membranous at the margins. Perianth 3 mm. long, widely elliptic: segments linear-lanceolate, acute, equal in length, submembranous; the outer lateral navicular, apiculate, widely keeled. Female spikelets about 1·5 cm. long, several in a spicate cyme, elliptic, cuneate at the base. Bracts 1·2—1·3 cm. long, loosely imbricate, linear-lanceolate, sharply acuminate, cartilaginous. Perianth 4·5 mm. long, stipitate, cartilaginous: outer segments linear, subacute; the lateral navicular, widely keeled, apiculate, decurrent on the stipe: inner segments distinctly shorter, elliptic-oblong, obtuse. Ovary elliptic, scabrid.

Cape Province.—Robertson Div.: Bushman's River, *Lewis* in Bolus Herb. 24763♂ and ♀.

The affinity is with *T. Muirii* Pillans from which it is distinguished by acuminate bracts of the male, by greater difference in length between the outer and inner perianth segments of the female, and by the keel of the outer lateral segments of the female flowers not being membranous. This species belongs to a group in which the perianth of the female flower is elliptic, ovate- or obovate-elliptic, and the outer-lateral segments are keeled rather than winged.

T. muticus sp. nov.; culmis simplicibus gracilibus laevibus; vaginis anguste oblongo-lanceolatis obtusis vel subacutis mucronatis coriaceis, marginibus membranaceis; spiculis femineis 1 vel 2 ellipticis in cymam spicatam dispositis; bracteis superioribus laxe imbricatis lanceolatis subacutis vel acutis cartilagineis, marginibus membranaceis; perianthio orbiculari vel rotundo; segmentis exterioribus lateralibus lanceolatis obtusis apiculatis, ala membranacea; segmento anteriore brevissime oblongo-lanceolato obtuso; segmentis interioribus brevissimis ovatis obtusis; ovario rotundo.

Stems 30—40 cm. high, unbranched, slender, smooth. Sheaths 2·5—3 mm. long, narrowly oblong-lanceolate, obtuse or subacute, mucronate, coriaceous, nervose, membranous at the margins. Female spikelets 1·2—1·5 cm. long, elliptic, 1 or 2 in a spicate cyme. Bracts at the base of the spikelets 1—1·5 cm. long, sheath-like. Bracts above the base about 8 mm. long, loosely imbricate, lanceolate, subacute or acute, cartilaginous, membranous at the margins. Perianth 4 mm. long, orbicular or rotund: outer lateral segments lanceolate, obtuse, apiculate, with a membranous wing 0·75 mm. wide; anterior segment much shorter, oblong-lanceolate, obtuse: inner segments $\frac{2}{3}$ as long as the outer lateral, ovate, obtuse. Ovary rotund.

Cape Province.—Robertson Div.: Bushman's River, *Lewis* in Bolus Herb. 24803♀.

The affinity is with *T. dichotomus* R. Br. from which it differs, in the female, with most of the bracts being acute or subacute without a mucro, and by the anterior perianth segment being oblong-lanceolate, obtuse and much shorter than the other outer segments.

T. nervosus sp. nov.; culmis caespitosis simplicibus laevibus; vaginis lineari-lanceolatis attenuatis sensim nervosis, marginibus ultra medium membranaceis; spiculis masculis lineari-oblongis; bracteis lanceolatis acutis, marginibus chartaceis; perianthii segmentis exterioribus cartilagineis, lateralibus lineari-oblongis subacutis; spiculis femineis oblongis in cymam spicatam vel paniculatam dispositis; bracteis lanceolatis acuminatis, marginibus anguste membranaceis; perianthio elliptico; segmentis exterioribus cartilagineis, lateralibus lineari-oblongis obtusis ultra medium carinatis; segmentis interioribus sensim brevioribus ovato-lanceolatis obtusis; ovario ultra medium scabrido.

Stems 30—50 cm. high, tufted, smooth, wiry, simple or with short sterile branchlets. Sheaths 3·5 cm. long, linear-lanceolate, attenuate, coriaceous, membranous at the upper margins, conspicuously nervose, soon becoming lacerated. Male spikelets 1—1·3 cm. long, linear-oblong, spreading or cernuous, in panicled cymes. Bracts 8 mm. long, lanceolate, acute, cartilaginous, papery and pale at the margins, loosely imbricate. Perianth 3 mm. long: outer segments cartilaginous; the lateral linear-oblong, subacute, mucronulate, navicular; the anterior linear-lanceolate, subacute: inner segments slightly longer, oblong-lanceolate, obtuse, membranous. Female spikelets 2—2·5 cm. long, oblong, cuneate at the base, several or many in a spicate or panicled cyme. Bracts 1—1·2 cm. long, lanceolate, acuminate, cartilaginous, narrowly pale-membranous at the margins, loosely imbricate. Perianth 4·5—5·5 mm. long, elliptic: outer segments cartilaginous; the lateral linear-oblong, obtuse, mucronu-

late, navicular, with a keel 0·5—0·75 mm. wide on the upper half; anterior segment lanceolate, subacute: inner segments much shorter, ovate-lanceolate, obtuse, membranous. Ovary scabrid on the upper half.

Cape Province.—Bredasdorp Div.: "Brandfontein," sandy flats near the coast, *Esterhuysen* 19014♂ and ♀ (in Bolus Herb.).

The affinity is with *T. fraternus* Pillans and *T. paniculatus* Mast. from which it is distinguished by the perianth of the female not long-tapered at the base, and by the outer segments not distinctly separated at the base. It is also distinguished from the former by the narrower and more tapered bracts of the female.

T. obtusus sp. nov.; culmis simplicibus gracilibus laevibus; vaginis lanceolatis acuminatis aristatis, marginibus ultra medium membranaceis; spiculis femineis 1 vel 2 ellipticis; bracteis lanceolatis acutis laxe imbricatis, marginibus anguste membranaceis; perianthio obovato-elliptico cartilagineo; segmentis exterioribus lateralibus lineari-oblongis obtusissimis navicularibus anguste carinatis; segmentis interioribus sensim brevioribus ovatis obtusis; ovario rotundo; fructu scabrido.

Stems usually 20—30 cm. high, sporadic, smooth, slender, simple or with many sterile branchlets at the base. Sheaths about 1·5 cm. long, lanceolate, acuminate, aristate, coriaceous and closely convolute in the lower half, membranous and soon lacerated at the upper margins. Female spikelets 1·3—1·5 cm. long, elliptic, usually in pairs. Spathe sheath-like, about half as long as the spikelet. Bracts 5—6 mm. long, lanceolate, acute, cartilaginous, narrowly membranous at the margins, red-brown, loosely imbricate. Perianth 2·5 mm. long, obovate-elliptic, cartilaginous, almost hidden by the bracts: outer lateral segments linear-oblong, very obtuse, navicular, with a keel scarcely 0·5 mm. wide; anterior segment about as long, lanceolate, obtuse: inner segments distinctly shorter, ovate, obtuse. Ovary rotund. Fruit subtrigonous, scabrid.

Cape Province.—Bredasdorp Div.: Bontebok Park, *Maguire* 836 (in Bolus Herb.).

This species is one of a group characterized by a comparatively narrow perianth and keeled, rather than winged, outer lateral perianth segments. There is no clear affinity with any other species.

T. papillosus sp. nov.; culmis simplicibus laevibus; vaginis arte convolutis anguste oblongo-lanceolatis acutis, marginibus late membranaceis; spiculis masculis lineari-oblongo; bracteis lanceolatis acutis, marginibus pallido-membranaceis; perianthio obovato-elliptico membranceo; segmentis exterioribus lateralibus lineari-oblongis acutis leviter carinatis; spiculis femineis elliptico-oblongis in cymam spicatam dispositis; bracteis anguste oblongo-lanceolatis mucronatis, marginibus pallido-membranaceis; perianthio orbiculari cartilagineo; segmentis

exterioribus lateralibus lineari-oblongis apiculatis conspicue alatis; ovario orbiculari.

Stems usually about 40 cm. high, unbranched, smooth. Sheaths 4—6 cm. long, closely convolute, narrowly oblong-lanceolate, acute, mucronate, coriaceous in the lower half, widely membranous at the margins, nervose. Male spikelets 1—1·5 cm. long, linear-oblong, cernuous many in a panicled cyme. Bracts loosely imbricate, 4—5 mm. long, lanceolate, acute, cartilaginous, membranous and pale at the margins. Perianth 3 mm. long, obovate-elliptic, mostly membranous: outer lateral segments navicular, linear-oblong, acute, apiculate, scarcely keeled; anterior segment linear-oblong, acute; inner segments about as long, lanceolate, obtuse. Female spikelets 1·5—2 cm. long, elliptic-oblong, about 4 in a spicate cyme. Bracts mostly 1·2—1·5 cm. long, narrowly oblong-lanceolate, acute, mucronate, cartilaginous, red-brown, pale and membranous at the margins; the lowermost 3—4 cm. long, sheath-like. Perianth 5 mm. long, orbicular, cartilaginous, on a stout stipe; outer lateral segments linear-oblong, subacute, apiculate, with a dorsal wing 1—1·5 mm. wide; anterior segment as long, narrowly lanceolate-oblong, acute; inner segments slightly shorter than the outer, ovate-lanceolate, acute, united at the base. Ovary orbicular, densely papillose on the upper half.

Cape Province.—Paarl Div.: Limietberg, *Esterhuysen* 1632♂ and ♀ (in Bolus Herb.).

This closely resembles and has affinity with *T. dichotomus* R. Br. from which it is distinguished by the female perianth being twice as large, and by a papillose ovary.

T. pellucidus sp. nov.; culmis caespitosis laevibus simplicibus vel ramosis; vaginis lineari-lanceolatis attenuatis, marginibus ultra medium pallido-membranaceis; spiculis masculis lineari-oblongis; bracteis lanceolatis subacutis ultra medium pallido-membranaceis; perianthio elliptico membranaceo; segmentis exterioribus lateralibus oblongis subacutis carinatis; segmentis interioribus elliptico-oblongis obtusis; spiculis femineis ellipticis 3—4 in cymam spicatam dispositis; bracteis lanceolatis mucronulatis papyraceis laxe imbricatis; perianthio late elliptico cartilagineo; segmentis exterioribus lanceolatis obtusis, lateralibus alatis; segmentis interioribus sensim brevioribus ovatis obtusis; ovario scabrido.

Stems 30—40 cm. high, tufted, smooth, slender, simple or with sterile branchlets. Sheaths 3—4 cm. long, linear-lanceolate, attenuate, mucronulate, cartilaginous, pale-membranous and lacerated at the upper margins. Male spikelets 1·5—2 cm. long, linear-oblong, spreading or cernuous, many in a panicled cyme. Bracts 8—9 mm. long, lanceolate,

subacute, mucronulate, cartilaginous at the base, pale-membranous above, loosely imbricate. Perianth 3 mm. long, elliptic, membranous: outer lateral segments oblong, subacute, keeled; the anterior oblong obtuse: inner segments slightly shorter, elliptic-oblong, obtuse. Female spikelets 2·5—3 cm. long, elliptic, cuneate at the base, usually 3 or 4 in a spicate cyme, rarely panicled. Bracts 1—1·2 cm. long, lanceolate, mucronulate, papery, transparent, loosely imbricate. Perianth 3·5—4 mm. long, widely elliptic, cartilaginous, subsessile: outer segments lanceolate obtuse; the lateral navicular, with a wing 0·5 mm. wide: inner segments much shorter, ovate, obtuse. Ovary scabrid.

Cape Province.—Bredasdorp Div.: "Brandfontein," sandy mountain slopes, *Esterhuysen* 19055♂ and ♀ (in Bolus Herb.).

This species has an affinity with *T. Schlechteri* Pillans in the size and structure of the female perianth, but is easily distinguished by the papery bracts and the greater number of spikelets produced in each inflorescence of the female plants.

T. piketbergensis sp. nov.; culmis late dispersis simplicibus laevibus; vaginis anguste oblongo-lanceolatis acutis, marginibus late membranaceis; spiculis masculis oblongis; bracteis lanceolatis obtusis, marginibus late membranaceis; perianthio elliptico membranaceo; segmentis lanceolatis obtusis; spiculis femineis 2 vel 3 ellipticis; bracteis lanceolatis acutis, marginibus late pallido-membranaceis; perianthio orbiculari; segmentis exterioribus lateralibus oblongo-lanceolatis late alatis pallido-membranaceis; segmentis interioribus sensim brevioribus ovatis; ovario obovato scabrido.

Stems mostly 70—80 cm. high, scattered, simple, wiry, smooth, minutely grey-speckled. Sheaths 3·5—4 mm. long, closely convolute, narrowly oblong-lanceolate, acute, mucronate, coriaceous in the lower half, becoming thinner upwards, widely pale-membranous at the margins. Male spikelets 1—2 cm. long, oblong, cuneate at the base, erect-spreading or cernuous, many in 1 or 2 panicles on a stem. Bracts 6—7 mm. long, loosely imbricate, lanceolate, obtuse, cartilaginous, widely membranous at the margins. Perianth 4 mm. long, elliptic, membranous, red-brown: outer lateral segments oblong-oblanceolate, obtuse, navicular, keeled; the anterior oblong-lanceolate, obtuse: inner segments almost as long as the outer, lanceolate, obtuse. Female spikelets 1·3—1·5 cm. long, elliptic, cuneate at the base, usually 2 or 3 in a spicate cyme. Bracts 1 cm. long, loosely imbricate, lanceolate, acute, cartilaginous, widely pale-membranous at the margins. Perianth 3·5—4 mm. long, much exposed at the sides of the bracts, stipitate, orbicular: outer lateral segments oblong-lanceolate, subacute, navicular, mostly pale-membranous, with wings 1 mm. wide at the middle; anterior segment almost as long, lanceolate,

obtuse; inner segments $\frac{2}{3}$ as long as the outer, ovate, obtuse. Ovary obovate, scabrid.

Cape Province.—Piketberg Div.: Piketberg Range, plateau north-east of Avontuur Mt., *Pillans* 7574♂ and ♀ (in Bolus Herb.).

The affinity is with *T. dichotomus* R. Br. from which it is distinguished in the female by the much larger perianth with hyaline membranous wings, and by the inner segments being much shorter than the outer.

T. plumosus sp. nov.; culmis caespitosis simplicibus vel ramosis laevibus vel leviter sulcatis; vaginis lanceolatis obtusis aristatis marginibus late membranaceis; spiculis masculis lineari-oblongis; bracteis erecto-patentibus oblongo-lanceolatis acuminatis, marginibus pallido-membranaceis; perianthio elliptico-obovato membranaceo; segmentis exterioribus lineari-oblongis subacutis; spiculis femineis 2—4 oblongis; bracteis erecto-patentibus lanceolatis acutis, marginibus membranaceis; perianthio obovato-elliptico; segmentis lineari-oblongis obtusis alatis; segmentis interioribus ovato-lanceolatis obtusis; ovario rotundo ultra medium papilloso.

Stems usually 40 cm. high, tufted, simple or with sterile branchlets, terete, almost smooth, sometimes slightly sulcate. Sheaths mostly about 4 cm. long, closely convolute, oblong-lanceolate, obtuse, coriaceous, widely membranous at the margins, nervose, with a long slender excurrent nerve at the apex. Male spikelets 1·5—3 cm. long, linear-oblong, cernuous, many in a plume-like panicled cyme. Bracts 1 cm. long, erect-spreading, oblong-lanceolate, acuminate, cartilaginous, red-brown, pale-membranous at the margins. Perianth 4 mm. long, elliptic-obovate, membranous: outer lateral segments linear-oblong, obtuse, apiculate, conspicuously keeled; the anterior lanceolate-linear, subacute; the inner slightly shorter, lanceolate, obtuse. Female spikelets 1·5—3 cm. long, oblong, attenuate at the base, usually 2—4 in a spicate cyme. Bracts about 1·3 cm. long, erect-spreading, lanceolate, acute, cartilaginous, membranous at the margins, the lowermost apiculate. Perianth 5 mm. long, shortly stipitate, obovate-elliptic: outer lateral segments linear-oblong obtuse, navicular, cartilaginous at the midrib, membranous in other parts, with a dorsal wing 1 mm. wide; anterior segment as long, lanceolate, subacute: inner segments slightly shorter than the outer, ovate-lanceolate, obtuse, membranous. Ovary rotund, distinctly papillose on the upper half.

Cape Province.—Cape Div.: Table Mt., west slopes above Llandudno, *Esterhuysen* 18604♂ and ♀ (in Bolus Herb.).

The affinity is with *T. nutans* Pillans from which it differs with slenderer stems, fewer and much longer male spikelets, with bracts not mucronate, and with distinctly longer female flowers.

T. similis sp. nov.; culmis simplicibus vel sparse ramosis laevibus; vaginis anguste oblongo-lanceolatis subacutis mucronatis, marginibus membranaceis; spiculis masculis oblongis in cymam paniculatam dispositis; bracteis oblongo-lanceolatis acutis, marginibus membranaceis; perianthio cuneato-oblongo; segmentis exterioribus lateralibus linearioblongis carinatis; spiculis femineis cuneato-obovatis 1—3 in cymam spicatam dispositis; bracteis oblongo-lanceolatis acutis, marginibus membranaceis; perianthio orbiculari; segmentis exterioribus lateralibus lineari-oblongis obtusis valde alatis; segmentis interioribus leviter brevioribus.

Stems 30—40 cm. high, simple or with a few barren branches, smooth. Sheaths 2·5—3 cm. long, narrowly oblong-lanceolate, subacute, mucronate, coriaceous, widely membranous at the margins, nervose. Male spikelets 1—1·5 cm. long, oblong, cernuous, many in a panicled cyme. Bracts 6—7 mm. long, oblong-lanceolate, acute, cartilaginous, membranous and pale at the margins. Perianth 4 mm. long, cuneate-oblong, membranous: outer lateral segments linear-oblong, obtuse, apiculate, keeled; the anterior slightly shorter, narrowly oblanceolate, acute: inner segements as long as the anterior, narrowly oblong-lanceolate, subacute. Female spikelets 1—1·3 cm. long, cuneate-obovate, 1—3 in a spicate cyme. Bracts 9 mm. long, oblong-lanceolate, acute, cartilaginous, membranous and pale at the margins, loosely imbricate. Perianth 3—3·5 mm. long, orbicular, shortly stipitate: outer lateral segments linear-oblong, obtuse, apiculate, with a membranous wing 0·75 mm. wide; anterior segment much shorter, lanceolate, obtuse: inner segments much shorter than the outer lateral, ovate, obtuse. Ovary rotund.

Cape Province.—Worcester Div.: Hex River Mts., Kleinberg, *Esterhuysen* 9322♂ and ♀ (in Bolus Herb.).

The affinity is with *T. dichotomus* R. Br. and *T. Stokoei* Pillans but it is distinguished from both by much smaller female spikelets, shorter and less tapered bracts, a very obtuse anterior segment, and by ovate inner segments much shorter than the outer.

T. sporadicus sp. nov.; culmis late dispersis laevibus vel rugulosis simplicibus vel ramosis; vaginis anguste lanceolato-oblongis acutis, marginibus pallido-membranaceis; spiculis masculis oblongis vel elliptico-oblongis cernuis; bracteis ovato-lanceolatis acutis, marginibus pallido-membranaceis; perianthio late elliptico; segmentis exterioribus lineari-oblongis obtusis; spiculis femineis 2 vel 3 ellipticis; bracteis laxe imbricatis oblongo-lanceolatis obtusis vel subacutis, marginibus pallido-membranaceis; perianthio rotundo vel late ovato; segmentis exterioribus lineari-oblongis obtusis, lateralibus navicularibus alatis; segmentis interioribus leviter brevioribus ovatis obtusis; ovario elliptico.

Stems 40—50 cm. high, sporadic on rhizomes, slender-wiry, smooth or rugulose, simple or with barren branches. Sheaths 3—4 cm. long, closely convolute, narrowly lanceolate-oblong, acute, apiculate, coriaceous, pale-membranous at the margins, nervose. Male spikelets 1—1·3 cm. long, oblong or elliptic-oblong, cernuous, many in a panicled cyme. Bracts 5—6 mm. long, loosely imbricate, ovate-lanceolate, acute, cartilaginous, pale-membranous at the margins. Perianth 3 mm. long, widely elliptic, membranous: outer segments linear-oblong, obtuse; the lateral navicular, apiculate: inner segments shorter, linear-oblong, obtuse. Female spikelets 1·5—2 cm. long, 2 or 3 in a spicate cyme, elliptic, cuneate at the base. Bracts 8 mm. long, loosely imbricate, oblong-lanceolate, obtuse or subacute, cartilaginous, pale-membranous at the margins, the lowermost few apiculate. Perianth 3·5 mm. long, stipitate, rotund or widely ovate, cartilaginous: outer segments linear-oblong, obtuse; the lateral navicular, with a wing 1 mm. wide: inner segments $\frac{2}{3}$ as long as the outer, ovate, obtuse. Ovary elliptic, smooth.

Cape Province.—Cape Div.: Table Mt., lower slopes north of Window Stream, *Esterhuysen* 17297♂ and ♀ (type, in Bolus Herb.), 18602♀.

Allied to *T. dichotomus* R. Br. but distinguished by the creeping rhizomes, wider spikelets of the male, by the obtuse or subacute bracts of the female, and by the obtuse anterior perianth segment.

Staberoha *Kunth.*

S. multispicula sp. nov.; culmis simplicibus gracilibus minute tuberculatis; vaginis arte convolutis oblongo-lanceolatis mucronatis coriaceis; spiculis masculis obovatis, basi cuneatis; bracteis laxe imbricatis oblongo-lanceolatis acutis cartilagineis; perianthio obovato membranaceo glabro; segmentis oblanceolatis acutis, exterioribus lateralibus leviter carinatis; spiculis femineis lineari-lanceolatis, basi attenuatis, 2—5 in cymam spicatam dispositis; bracteis laxe imbricatis oblongo-lanceolatis apiculatis cartilagineis; perianthio sessili elliptico; segmentis exterioribus lateralibus lineari-oblongis obtusissimis navicularibus, ultra medium alatis; segmentis interioribus lanceolatis obtusis membranaceis; ovario rotundo; stylis tribus liberis.

Stems 40—50 cm. high, simple, wiry, minutely tubercled. Sheaths 1·5—3 cm. long, closely convolute, oblong-lanceolate, subacute, mucronate, coriaceous, red-brown, grey-speckled. Male spikelets 1—1·5 cm. long, obovate, cuneate at the base, cernuous, many in a panicled cyme. Spathes about 1 cm. long, oblong-lanceolate, obtuse, mucronate, coriaceous. Bracts 6—7 mm. long, loosely imbricate, oblong-lanceolate, acute, cartilaginous, red-brown, pale at the margins. Perianth 3·5 mm. long,

obovate, membranous, glabrous: segments oblanceolate, acute; the outer lateral navicular, slightly keeled; the inner slightly shorter. Female spikelets mostly 1·5—2·5 cm. long, linear-lanceolate, attenuate at the base, usually 2—5 in a spicate cyme. Spathes usually 1·2—1·5 cm. long, oblong-lanceolate, mucronate, coriaceous. Bracts 1—1·2 cm. long, loosely imbricate, oblong-lanceolate, apiculate, cartilaginous, red-brown. Perianth 4 mm. long, sessile, elliptic: outer lateral segments linear-oblong, very obtuse, navicular, cartilaginous at the midrib, membranous elsewhere, with a wing 0·5 mm. wide in the upper half; anterior segment widely linear, obtuse: inner segments lanceolate, obtuse, membranous, slightly shorter or as long as the outer. Ovary rotund. Styles 3, free.

Cape Province.—Bredasdorp Div.: "Franskraal," *Leighton* 1897♂ and ♀ (in Bolus Herb.).

The affinity is with *S. aemula* Pillans and *S. distachya* Kunth from which it is distinguished by the narrower and greater number of female spikelets in an inflorescence, and by the greater number of styles.

S. Stokoei sp. nov.; culmis simplicibus gracilibus laevibus; vaginis oblongo-lanceolatis attenuatis cartilagineis, apice membranaceis; spiculis masculis obovatis, basi cuneatis; bracteis lanceolatis acuminatis, marginibus membranaceis; perianthio cuneato glabro; segmentis exterioribus oblanceolatis obtusis, lateralibus ultra medium anguste alatis; spiculis femineis solitariis oblongis, basi attenuatis; bracteis erecto-patentibus lanceolatis acuminatis, marginibus pallido-membranaceis; perianthio cuneato glabro; segmentis oblanceolatis obtusissimis membranaceis, exterioribus lateralibus ultra medium alatis; ovario elliptico, summo expanso plano; stylo solitario.

Stems 20—30 cm. high, simple, slender-wiry, smooth. Sheaths mostly 2·5—3 cm. long, convolute at the base, erect-spreading above, oblong-lanceolate, attenuate, coriaceous and with membranous margins at the base, becoming cartilaginous and pale-membranous above. Male spikelets 1—1·5 cm. long, obovate, cuneate at the base, erect, 1 or 2 in a spicate cyme. Spathes sheath-like. Bracts about 1 cm. long, loosely imbricate, lanceolate, acuminate, cartilaginous, red-brown, pale-membranous at the margins. Perianth 3 mm. long, stipitate, cuneate, glabrous: outer segments oblanceolate, obtuse, cartilaginous, membranous at the margins; the lateral navicular, with a narrow membranous wing near the apex; the anterior dorsally compressed: inner segments distinctly shorter, oblanceolate, obtuse, membranous. Female spikelets 1·8—2 cm. long, solitary, oblong, tapering towards the apex. Spathe sheath-like, slightly overtopping the spikelet. Bracts 1·5—1·8 cm. long erect-spreading, lanceolate, acuminate, coriaceous and red-brown at the base, thinner and paler upwards and outwards, pale-membranous at the margins and

apex. Perianth 3·5 mm. long, stipitate, cuneate, glabrous: outer segments oblanceolate, very obtuse, cartilaginous at the midrib, membranous elsewhere; the lateral navicular, with a wing almost 0·5 mm. wide in the upper half, narrowing downwards: inner segments about as long, oblanceolate, very obtuse, membranous. Ovary elliptic, with an expanded flat and hard top. Style solitary.

Cape Province.—Prince Albert Div.: Swartberg Pass Area, *Stokoe* 9011♂ and ♀ (in Bolus Herb.).

Remarkable in the genus as the first species recorded with a solitary style, and the only one with a wide flat cap on the ovary.

Hypolaena *R. Br.*

H. tenuissima sp. nov.; culmis ramosis paulum compressis pustulatis; vaginis arte convolutis lineari-lanceolatis obtusis, marginibus membranaceis; spiculis femineis linearibus terminalibus vel axillaribus; bractea oblongo-lanceolata obtusa, marginibus late membranaceis; perianthio stipitato lineari membranaceo; segmentis exterioribus 2 vel 3 lanceolatis obtusis glabris; segmentis interioribus brevioribus lanceolatis acutis; ovario oblongo; stylis ad medium connatis.

Stems 20—30 cm. long, very slender or filiform, slightly compressed, finely pustulate, very minutely setulose on the upper parts, much branched and tangled. Sheaths 0·5—1 cm. long, linear-lanceolate, obtuse, coriaceous, widely membranous at the upper margin, ending in a long subulate mucro, closely convolute. Female spikelets 2·5—3 mm. long, few, terminal or axillary, linear. Spathe 3 mm. long, ovate, obtuse, mucronate, cartilaginous, widely membranous at the margins. Bract 3 mm. long, oblong-lanceolate, obtuse, mucronate, cartilaginous, widely membranous at the margins. Perianth 2 mm. long linear, distinctly stipitate: outer segments 2 or 3, lanceolate, obtuse, membranous, with a cartilaginous nerve, glabrous: inner segments 2 or 3, scarcely half as long, ovate-lanceolate, acute, membranous. Ovary oblong. Styles united to the middle.

Cape Province.—Ceres Div.: Olifants River, southern portion, margin of stream, *Esterhuysen* 14286♀ (in Bolus Herb.).

The nearest affinity seems to be with *H. Stokoei* Pillans from which it differs with slenderer stems and much smaller female spikelets. The description is based on flowering material collected in January, 1948.

H. crinalis comb. nov.; **Restio crinalis** *Mast. in Journ. Linn. Soc.*, viii, 229 (1865)!; *in DC. Monog. Phan.*, i, 239 (1878); *Durand & Schinz, Consp. Fl. Afr.*, v, 505 (1895); *Mast. in Harv. & Sond. Fl. Cap.*, vii, 72 (1897); *Pillans in Trans. Roy. Soc. S. Afr.*, xvi, 296 (1928). **Hypolaena tabularis** *Pillans* op. cit. 394.

R. crinalis was described from a male plant, and *H. tabularis* was described from a female. It is now evident from subsequently collected material that the two are conspecific. The perianth segments of the female elongate considerably during the fruiting period, thereby changing the proportion of width to length. The following is an amended description, followed by records of distribution.

Stems usually 30—60 cm. long, ascending or decumbent, much branched, terete, or the upper parts slightly compressed, slender-wiry or very slender, tubercled throughout, or wrinkled or almost smooth. Sheaths 1·5—3 cm. long, linear-lanceolate, long-attenuate, coriaceous in the lower half, membranous at the upper margins, closely convolute; the upper half awn-like, very slender, membranous, often repeatedly bent. Male spikelets 4—8 mm. long, usually 2—4 in a spicate cyme, obovate, laxly 1—4-flowered. Spathes sheath-like. Bracts 3—4 mm. long, lanceolate, acuminate, membranous. Perianth 2·5—2·75 mm. long, much exposed, elliptic- or cuneate-oblong, glabrous: outer segments oblong-lanceolate, acute, navicular, cartilaginous, membranous at the margins: inner segments obtuse, membranous. Female spikelets 0·7—1·5 cm. long, 1—3 in a spicate cyme, oblanceolate or linear-oblong, terete, containing one perfect and one rudimentary flower. Spathe oblong-lanceolate, aristate, coriaceous, ± membranous at the margins. Bracts many, 5—8 mm. long, oblong-lanceolate, apiculate, membranous at the margins. Perianth 2·5—3 mm. long, on a stout stipe, oblong, terete, truncate, glabrous: segments closely convolute, very obtuse, emarginate; the outer widely oblong, or rotund; the inner orbicular, shorter. Ovary sessile, obovate or elliptic, with a hardening cap. Styles 3, cohering at the base, becoming free.

Cape Province.—Caledon Div.: Rooskraal Nature Reserve, *Esterhuysen* 2828♂; Somerset Sneeuwkop, *Esterhuysen* 3598♂ and ♀, *Stokoe* 6716♀; vicinity of Landdrost Kop, *Stokoe* in Bolus Herb. 24734♂, 24735♂ and ♀, *Esterhuysen* 3595♂.—Cape Div.: Table Mt., summit, *L. Kensit* in Bolus Herb. 9700♂, *Pillans* 4897♂ and ♀; Echo Valley, *Pillans* 4143♀ (type of *Hypolaena tabularis*, in Bolus Herb.).—Paarl Div.: Lower Wellington Sneeuwkop, *Esterhuysen* 12466♂ and ♀; Upper Wellington Sneeuwkop, *Esterhuysen* 8657a♂ and ♀; Seven Sisters, *Stokoe* in Bolus Herb. 24736♂; Pic Blanc, *Esterhuysen* 1666♀, 1668♂; Wemmershoek Mts., *Esterhuysen* 9572♀; Slanghoek Mts., Witteberg, near summit, *Esterhuysen* 8676♂, 16530♂ and ♀; marsh between Witteberg Peak and Krom River Peak, *Esterhuysen* 9500♂.—Robertson Div.: Wilde Paardeberg, *Stokoe* 2788♂, 2789♂, 2790♀, 2791♀.—Stellenbosch Div.: Groot Drakenstein Mts., Buller's Kop, *Esterhuysen* 11901♂ and ♀.—Swellendam Div.: Zonder Einde Peak, south side, *Stokoe* 9271♀, 9373♂ and ♀.—Worcester Div.: Du Toit's Kloof, *Drege* 11♂ (cotype of *Restio crinalis*, in Bolus Herb.).

H. diffusa Mast. Only the male plant was known when this species was first published. The present writer published a description of a plant believed to be the female, but since then it has been identified as belonging to another species. The undoubted female is now available. The following description of the female should be substituted for that given in my monograph.

Spikelets 4·5—5 mm. long, cylindric, terminal and solitary, or 2 or 3 in a spicate cyme, subtended by 2 or 3 sheath-like spathes. Bracts 2 or 3, tightly convolute, linear-oblong, very obtuse, firmly cartilaginous, membranous at the apex, scabrid on the outer surface, dark brown; the inner with a minute vestige, near the apex, of a prolongation of the axis of the spikelet. Perianth 4 mm. long, subsessile, pale-membranous; segments 5, oblong-lanceolate, subacute, rounded on the outer surface, glabrous. Ovary elliptic-oblong, with a conical cap. Styles 3, united to the middle.

Cape Province.—Caledon Div.: mountains at Houwhoek, *Burchell* 8065♂ (cotype of *H. diffusa*, in Bolus Herb.); between Viljoen's Pass and Somerset Sneeuwkop, *Stokoe* 7041♀ (type, in Bolus Herb.); Elgin, *Parker* 4647♀, 4648♂; hills above Rooi Els, *Parker* 4661♂ and ♀.—Paarl Div.: French Hoek, *Schlechter* 9341♂, 9342♂.

Hypodiscus *Nees.*

H. Parkeri sp. nov.; culmis gracilibus teretibus; vaginis oblongo-lanceolatis aristatis coriaceis persistentibus; spiculis masculis obovatis in cymas spicatas dispositis; bracteis oblongis acutis mucronatis coriaceis, margine membranaceis; perianthio membranaceo; segmentis exterioribus lineari-oblongis apiculatis; spiculis femineis ovato-lanceolatis 1—3 in cymam spicatam dispositis; bracteis ut in mare; perianthio membranaceo stipitato; segmentis exterioribus oblongis acutis spiculatis; segmentis interioribus conspicue brevioribus lanceolatis acutis; ovario tuberculato; stylis basi connatis.

Stems 20—30 cm. high, slender-wiry, crowded on creeping rhizomes. Sheaths about 2 cm. long, oblong-lanceolate, aristate, coriaceous, mostly basal, persistent. Male spikelets 0·7—1 cm. long, obovate, 2 to many in a spicate cyme. Spathe sheath-like, expanded. Bracts 5—6 mm. long, oblong, abruptly acute, mucronate, coriaceous, membranous at the upper margins, loosely imbricate, reddish. Perianth 4 mm. long, membranous, pale, very much compressed: outer segments linear-oblong, acute, apiculate; the lateral navicular: inner segments slightly shorter, lanceolate, acute. Female spikelets 7 mm. long, ovate-lanceolate, 1—3 in a spicate cyme. Spathe and bracts as in the male. Perianth 3·5 mm.

long, membranous, on a stout stipe: outer segments oblong, acute, apiculate, with a conspicuous dorsal nerve: inner segments distinctly shorter, lanceolate, acute. Ovary entirely tubercled, with a ring of ascending tubercles at the apex. Styles free almost to the base.

Cape Province.—Stellenbosch Div.: Somerset West, low hill-slopes, gravelly clay soil, *Parker* 3519♂, 3520♀ (in Bolus Herb.).

The affinity is with *H. albo-aristatus* Mast. from which it differs with stems on creeping rhizomes, with bracts almost rounded and mucronate at the apex, and with much longer perianth segments of the female.

Willdenowia *Thunb.*

W. xerophila sp. nov.; culmis simplicibus laevibus; vaginis arte convolutis acutis aristatis; inflorescentia mascula paniculato-cymosa; bracteis lanceolatis acuminatis membranaceis; perianthio pedicellato membranaceo; segmentis lanceolatis; spiculis femineis 2 vel 3, 1-vel 2-floris; spathis lanceolatis acutis; bracteis ovato-lanceolatis cartilagineis arte convolutis; perianthio stipitato; segmentis orbicularibus apiculatis membranaceis imbricatis; ovario elliptico; fructu late cylindrico ruguloso.

Stems usually 40—60 cm. high, 2·5—3 mm. thick at the middle, unbranched, smooth or almost so. Sheaths 2·5—3·5 cm. long, lanceolate, acute, aristate, coriaceous, cartilaginous and lacerate at the upper margins, conspicuously nervose, pale chestnut-brown, closely convolute. Male inflorescence 5—7 cm. long, an oblong dense panicle. Spathes about 3 cm. long, sheath-like. Branchlets usually 0·5—1 cm. long, very laxly many-flowered, several in each axil. Bracts mostly 6—8 mm. long, lanceolate, acuminate, membranous. Perianth 4 mm. long, pedicellate, membranous: outer segments linear-lanceolate, acuminate, carinate: inner segments slightly shorter, lanceolate, acute, subcarinate. Female inflorescence 3—5 cm. long, a compact spicate cyme. Spikelets 2 or 3, 1- or 2-flowered. Spathes 2—3 cm. long, lanceolate, acute, coriaceous, brown, erect. Bracts 1·4—1·7 cm. long, ovate-lanceolate, acute, cartilaginous, closely imbricate, pale. Perianth 2·5 mm. long, membranous, on a stout grooved stipe 2 mm. long: segments orbicular in outline, apiculate, imbricate. Ovary cylindric, with a hard discoid cap. Styles free, with a stigmatic surface from base to apex. Fruit widely cylindric, depressed on the summit, rugulose, on a grooved stipe.

Cape Province.—Ceres Div.: Matroosberg, ridge on north side, *Esterhuysen* 18727♀.—Prince Albert Div.: Klein Zwartberg, kloof facing north, *Andreae* 1279♂ and ♀.—Swellendam Div.: Anysberg, south slopes, *Esterhuysen* 17088♂ and ♀ (type, in Bolus Herb.).

The affinity is with *W. fimbriata* Kunth from which it differs with acute and much shorter spathes of the female inflorescence, and with the irregularly grooved and shorter stipe of the female flower.

THE GENUS PYRROSIA (POLYPODIACEAE) IN AFRICA.

By E. A. C. L. E. Schelpe
(*Fielding Herbarium, Oxford University*)

Some of the species of the genus *Pyrrosia* have a wide distribution in continental Africa. Consequently, it has been found necessary to review the known species of the genus in the continent in order to establish the taxonomic status of some of the species in Southern Africa. The geographical area considered in this revision includes continental Africa and the islands of Principe and São Thomé. Reference is also made to species of the genus occurring in Madagascar and the Mascarene Islands.

Copeland (1947) has been followed in upholding the name *Pyrrosia* in view of taxonomic convenience and general usage of the name. *Candollea* Mirbel (Hist. Nat. Veg., 5 (1803), 86) has only page priority over *Pyrrosia* Mirbel (Hist. Nat. Veg., 5 (1803), 91) which is not recognised by the International Rules of Botanical Nomenclature, and it is felt that there are good arguments for the conservation of *Candollea* Labill. (Stylidiaceae).

Spore dimensions given in this revision are average measurements made on spores mounted directly in Canada Balsam.

Key to the African Species of Pyrrosia

1. Tomentum on the frond composed of stellate hairs of one kind only (uniform) 2
   Tomentum on the frond composed of stellate hairs of two kinds (dimorphic) .. .. 7. *Stolzii*
2. Stellate hairs on the frond with long, thin brownish arms .. 3
   Stellate hairs on the frond with short, flat white arms .. 4
3. Rhizome scales dull, ovate-lanceolate, laciniate .. 1. *africana*
   Rhizome scales shining, linear-lanceolate, sub-entire to shortly ciliate .. .. 2. *rhodesiana*
4. Rhizome scales ciliate, fronds widely spaced on a long slender rhizome .. .. 6. *lanceolata*
   Rhizome scales entire 5
5. Fronds linear, 1·5—2·5 mm. broad .. .. .. 5. *Liebuschii*
   Fronds linear to lanceolate or oblanceolate, more than 5 mm. broad 6
6. Rhizome scales acuminate, often with a hair-point 3. *Schimperiana*
   Rhizome scales rounded or cucullate at the apex.
   4. *Schimperiana* var. *Mechowii*

1. **Pyrrosia africana** (Kunze) Ballard

Pyrrosia africana (Kunze) Ballard, Kew Bull., 1937, 349 (1937). *Niphobolus africanus* Kunze, Linnaea, 10, 501 (1839); Pappe & Rawson, Syn. Fil. Afr. Austr., 41 (1858); Giesenhagen, *Niphobolus*, 177 (1901); Engler & Prantl, Nat. Pfl., 1, 4, 325 (1902). *Gyrosorium africanum* (Kunze) Presl, Epim. Bot., 140 (1849). *Polypodium africanum* (Kunze) Mett., *Polypodium*, n. 268 (1857) (non Desv., 1827); Kuhn, Fil. Afr., 145 (1868); Hook & Bak., Syn. Fil., ed. ii, 351 (1874); Sim, Ferns S. Afr. ed. i, 203 (1892); Christ, Farnk. d. Erde, 98 (1897). *Cyclophorus africanus* (Kunze) C. Chr., Ind. Fil., 197 (1905); Sim, Ferns S. Afr., ed. ii, 283 (1915).

Rhizome creeping, 3—4 mm. diam., paleaceous, bearing fronds at intervals of 0·2—1·4 cm. Rhizome scales pale brown, dull, ovate-lanceolate, laciniate, up to 8 mm. long and 3 mm. broad. *Stipe* 0—2·5 cm. long, 2—3 mm. diam., tomentose when young becoming glabrous with age. *Frond* simple (occasionally bifurcate) lanceolate-acuminate to oblanceolate, tomentose below, more or less glabrous above with age, 5·6—30·0 cm. long, 1·1—3·0 cm. broad, apex acute-acuminate, base narrowly cuneate-decurrent, margin narrowly recurved. Tomentum ferrugineous, composed of uniform stellate hairs whose arms are up to 0·9 mm. long. Hydathodes apparently absent. Dorsal surface of the frond verrucose above ventral soral areas. *Sori* usually emergent through the tomentum, confined to the upper half of the frond with few exceptions. *Spores* smooth, 68 $\mu \times 45 \mu$.

Christensen (1932) was of the opinion that the sori in *P. africana* were confined to the upper third of the lamina. This is true for most of the material examined but in some specimens the soral area extends halfway down the lamina and even farther in a few fronds. The dull, large, laciniate rhizome scales and the narrowly revolute margin of the lamina distinguish it from *P. rhodesiana*. (Fig. 1). Also, the arms of the stellate hairs of the tomentum are shorter and stouter than in *P. rhodesiana* (Fig. 2).

P. africana appears to be confined to the Eastern Cape Province and Natal in the Union of South Africa, where it occurs as an epiphyte. It has been found growing on the trunks of Encephalartos in the Eastern Cape Province. Individuals growing in exposed situations produce comparatively small fronds.

Type Locality

"In rupium faucibus inter Omtata et Omgaziana," *Drège s.n.* (Herb. Kunze). The Herbarium of G. Kunze at Leipzig is believed to have been destroyed during the war.

Distribution

UNION OF SOUTH AFRICA

Cape Province. **East London:** Bonza Bay, *Bottomley s.n.* (PRE);

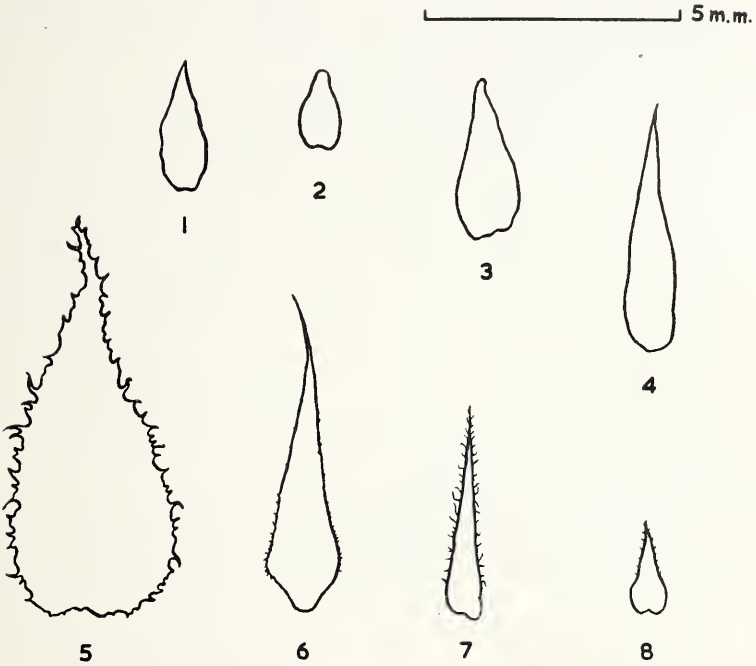

Fig. 1. Outlines of rhizome scales of African species of *Pyrrosia*. 1. *P. Liebuschii* (Peter 7979). 2. *P. Schimperiana* var. *Mechowii* (Eggeling 1473). 3. *P. Schimperiana* var. *Mechowii* (Kassner 2947). 4. *P. Schimperiana* (Schweinfurth 2003). 5. *P. africana* (Drège s.n.). 6. *P. rhodesiana* (Gilliland 2105). 7. *P. lanceolata* (Honey 688). 8. *P. Stolzii* (Stolz 1912).

Cave Rock, *D'Urban s.n.* (K, OXF); East London, *Murray s.n.* (BOL, CTM); Fort Murray, *Mogg s.n.* (PRE); Horseshoe Valley, *C. A. Smith* 3818 (PRE); Nahoon River, *Galpin* 5601 (PRE); Gonubie Springs, *Acocks* 10978 (PRE). **Kentani:** Kentani, *Pegler* 303 (PRE). **King Williams Town:** Pirie, *Polls s.n.* (BOL); Yellowwood Falls, *Sim s.n.* (BOL, PRE, TRV). **Komgha:** Komgha, *Flanagan s.n.* (TRV), *Flanagan* 830 (PRE). **Port St. Johns:** Port St. Johns, *Alsopp & Brueckner* 220 (BM, NU), *Mogg s.n.* (PRE), *Schelpe s.n.* (NU), *H. Wager s.n.* (PRE). **Umtata:** Between Umtata and Umgaziana, *Drège s.n.* (BM) (Type collection).

Without locality: *Drège s.n.* (OXF).

Natal. **Eshowe:** Eshowe, *Rogers* 24480 (TRV), *Thode A*,12576 (NH, PRE). **Lower Tugela:** Tugela River, *Wood s.n.* (CTM).

Locality unknown: Umgoe Mtns., *Plant* 309 (BM, K). Without locality: *Buchanan s.n.* (NH), *Rawson* 943 (BM).

2. **Pyrrosia rhodesiana** (C. Chr.) Schelpe comb. nov.

Cyclophorus rhodesianus C. Chr., Dansk. Bot. Arkiv, 7, 161 (1932); C. Chr., Ind. Fil., Suppl. III, 65 (1934).

Rhizome creeping, ± 3 mm. diam., paleaceous, bearing fronds at intervals of 0·2—1·5 cm. Rhizome scales light brown, shining, lanceolate-subulate, sub-entire above, denticulate below, up to 6 mm. long and 1·5 mm. broad. *Stipe* 1·2—8·0 cm. long, ± 2 mm. diam., tomentose when young becoming glabrous with age. *Frond* simple (occasionally bifurcate), lanceolate, narrowly elliptical to oblanceolate, tomentose below more or less glabrous above, 6—30 cm. long, 1—3 cm. broad, apex narrowly acute to rounded, base narrowly cuneate, margin plane. Tomentum ferrugineous, composed of uniform stellate hairs whose arms are slender, up to 1·1 mm. long. Hydathodes present, appearing as black sunken spots on the dorsal surface of the frond. *Sori* sunk in the tomentum, usually occurring over the greater part of the frond. *Spores* smooth, 84 $\mu \times 54\ \mu$.

P. rhodesiana can be distinguished most easily from the related *P. africana* by its shining, lanceolate-subulate rhizome scales. The arms of the stellate hairs of the frond tomentum are longer and more slender than in *P. africana* (Fig. 2).

The species occurs as a saxicole or an epiphyte on tree trunks in forest, and has an East African distribution extending from Southern Rhodesia to Uganda.

Type Locality

Southern Rhodesia, Umtali, *Eyles* 4472 at Kew Herbarium.

Distribution

SOUTHERN RHODESIA

Chinakwarimba, Vumba Mtns., Umtali, *Chase* 3297 (BM, SAL). Chirinda Forest, *Wild* 2119, 2231 (K), *Swynnerton* 425 (K). Umtali. *Eyles* 4472 (BOL, K, PRE) (Type collection). Vumba Mountains, *Chase* 3102, 3394 (BM), *Fisher* 222 (K, NU), *Fisher* 1138, 1577, 1635*a* (BM, NU). Ziwani Forest, *Gilliland* 2015 (BM).

PORTUGUESE EAST AFRICA

Garuso, *Fisher & Schweickerdt* 449 (BM, K, NU). "Jaegersberg", Garuso Forest, *Chase* 3296 (BM). Gazaland, Chipete Forest, *Swynnerton* 425*a* (BM). Gorongoza, *De Carvalho s.n.* (BM). Macequece, *Fisher & Schweickerdt* 449 (BM, K, NU). Manica, Mavita, *Pedro & Pedrogao* 6466 (BM). Montes de Milange, *Torre* 4577 (BM). Zambesi River, *Chase* 3245 (BM).

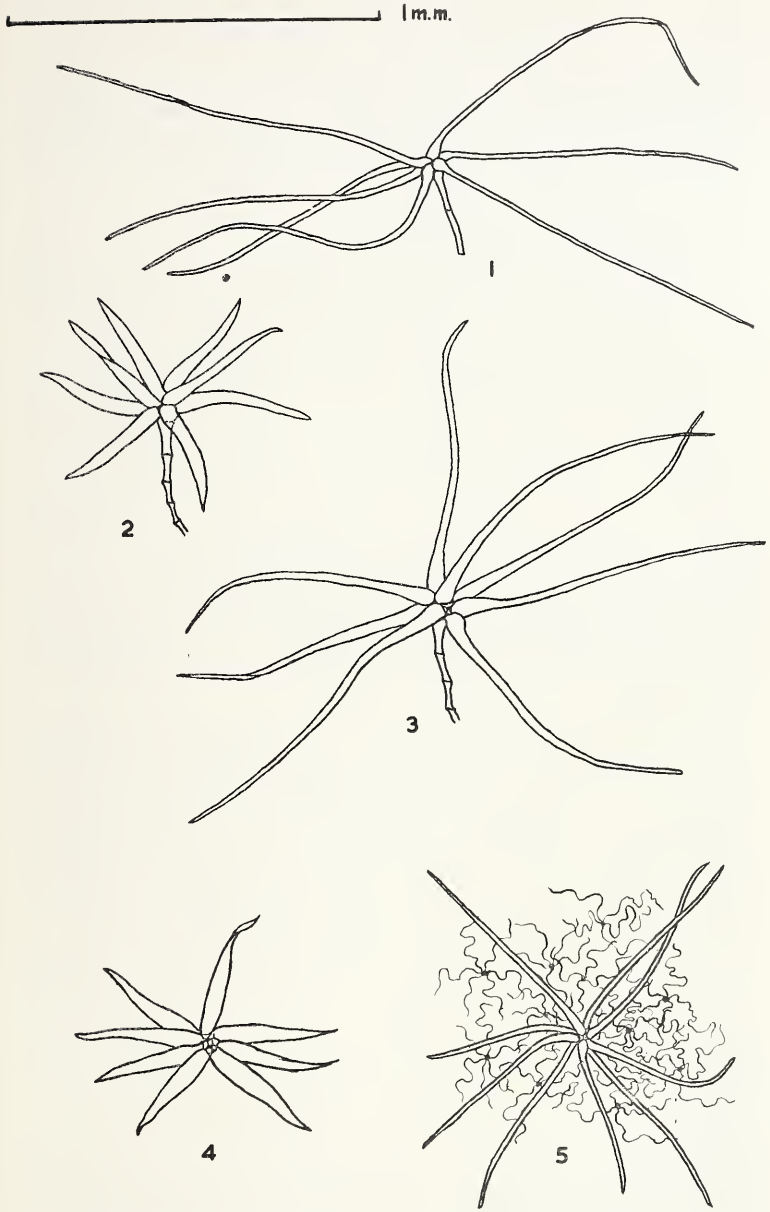

Fig. 2. Frond tomentum hairs of African species of *Pyrrosia*. 1. *P. rhodesiana* (Gilliland 2105). 2. *P. Schimperiana* (Mendonça 3690). 3. *P. africana* (Rawson 943). 4. *P. lanceolata* (Lebrun 987). 5. *P. Stoltzii* (Stolz 1912).

NYASALAND

Near Blantyre, *Last s.n.* (K). Namuli, Makua country, *Last s.n.* (K). Shire, *Scott Elliott* 8523 (BM). Shire Highlands, *Buchanan* 28 (K).

UGANDA

Mt. Elgon, *Snowden* 787 (BM).

3. **Pyrrosia Schimperiana** (Mett.) Alston.

Pyrrhosia Schimperiana (Mett.) Alston, Journ. Bot., 72, Suppl. II, 8 (1934). *Polypodium Schimperianum* Mett. ex Kuhn, Fil. Afr., 152 (1868). *Cyclophorus Schimperianus* (Mett.) C. Chr., Ind. Fil., 200 (1905).

Rhizome creeping, 1·5—2·5 mm. diam., paleaceous, bearing fronds at intervals of 1—9 mm. Rhizome scales lanceolate, acuminate, often hair-pointed, entire, up to 6 mm. long and 1·1 mm. broad. *Stipe* 0—0·4 cm. long, ± 2 mm. diam., tomentose when young becoming glabrous with age. *Frond* simple (occasionally 2—4-furcate at apex) linear, lanceolate, elliptic or oblanceolate, tomentose below, more or less glabrous above, 6·7—21·0 cm. long, 0·5—1·2 cm. broad, apex acute to acute-acuminate, base narrowly cuneate-decurrent, margin plane (or frond inrolled). Tomentum grey or greyish brown composed of uniform stellate hairs whose flattened arms are up to 0·35 mm. long. Hydathodes present, appearing as sunken white dots. *Sori* eventually emergent through the tomentum, usually confined to the upper half of the frond. *Spores* smooth, 69 $\mu \times 45 \mu$.

Hieronymus (1912) regarded *Cyclophorus Mechowii* as a species distinct from *C. Schimperianus* (Mett.) on the diameter of the rhizome, the shape and structure of the rhizome scales and whether or not the fronds are sessile. In the material examined by the author, the shape of the rhizome scale apices was found to be the only useful character in separating these two "species". Hieronymus appears to have regarded the presence of a distinct velum of hyaline cells around the border of the rhizome scales as a differentiating character of some importance. However, the presence of a distinct velum cannot be correlated with rounded or cucullate rhizome scales alone. Some of the West African material, which can be ascribed to *C. Mechowii* on the character of the rhizome scales having rounded cucullate apices, has an extremely narrow velum e.g. *Mann* 788. On the other hand, some Southern Rhodesian and Mozambique specimens, referred to *C. Schimperianus*, because of the markedly acuminate, often hair-pointed, rhizome scales, exhibit a wide, distinct marginal velum. In one collection, *Pedro & Pedrogao* 6063, some of the rhizome scales have very blunt, widely acute apices although most of the scales are acuminate often ending in a hair. If only equatorial African material is considered the existence of two related "species" is

apparent as it was to Hieronymus. However, the examination of later collections, especially from Southern Rhodesia and Portuguese East Africa has led the present author to the conclusion that these two groups are better treated as a species and a variety.

Pyrrosia Schimperiana is either saxicolous or epiphytic on trees. Judging from the available material, the species as construed here appears to have two separate areas of distribution, one about Abyssinia and Eritrea and another in Southern Rhodesia and Portuguese East Africa.

Type Locality

Abyssinia, Dscha-Dsche, *Schimper* 1441. The type specimen is thought to be in Berlin and not available at present. A photograph of this specimen is in the British Museum (Nat. Hist.), London.

Distribution

SOUTHERN RHODESIA

Near Salisbury, *Eyles* 8810 (K). Umwindisi R., Enterprise, *Wild* 2007 (BM).

PORTUGUESE EAST AFRICA

Manica e Sofala, Chimoio, Gondola, Nhamoare, *Mendonça* 3690 (BM). Gondola, Amatongas Forest, *Fisher* & *Schweickerdt* 273 (BM, K, NU). Gondola, *Pedro* & *Pedrogao* 6063 (BM). Zambesiland, *Kirk s.n.* (K).

ERITREA

Ghinda, Embatkalla, *Schweinfurth* 2003 (K).

4. **Pyrrosia Schimperiana** (Mett.) var. **Mechowii** (Hieron.) Schelpe comb. nov.

Cyclophorus Mechowii Hieron., Engl. Jahrb., 46, 395 (1911); C. Chr., Ind. Fil., Suppl. I, 22 (1913) (*Niphobolus Mechowii* Brause & Hieron. (nomen), Veg. d. Erde, 9, Pflanzenwelt Afrikas, 2, i, 55 (1908).). *Niphobolus Schimperianus* Giesenhagen (non *Polypodium* Mett. 1868), *Niphobolus*, 112 (1901).

Rhizome creeping, 1·5—2·5 mm. diam., paleaceous, bearing fronds at intervals of 0·1—1·2 mm. Rhizome scales ovate to ovate-lanceolate, entire, apex rounded often cucullate, up to 3·2 mm. long and 1·2 mm. broad. *Stipe* 0·1—2·8 cm. long, ± 2 cm. diam., tomentose when young becoming glabrous with age. *Frond* simple, linear to oblanceolate, tomentose below, more or less glabrous above, 6·2—33·6 cm. long, 0·8—2·3 cm. broad, apex widely acute to acute-acuminate, base narrowly cuneate-decurrent, margin plane (or leaf inrolled). Tomentum grey or greyish-brown composed of uniform stellate hairs whose flattened arms are up to 0·34 mm. long. Hydathodes present, appearing as white dots on the dorsal surface. *Sori* emergent through the tomentum, usually confined to the upper half of the frond. *Spores* smooth, 66 μ × 39 μ.

The variety *Mechowii* is distinguished by its rhizome scales which are rounded, often cucullate, at the apex. The spores of the variety are somewhat smaller on the average than in *P. Schimperiana*, but an overlap of spore dimensions does occur.

This variety is saxicolous or epiphytic and has a known distribution across Central Africa stretching from Nigeria in the west to Kenya in the east and to Northern Rhodesia and Nyasaland in the south.

Type Locality

Cameroons, Ambas Bay, *Mann* 788. The type specimen is thought to be at Berlin; specimens of the type collection are at Kew and the British Museum (Nat. Hist.), London.

Distribution

PORTUGUESE EAST AFRICA

Niassa prov., Monte Massangulo, *Gomes e Sousa* 1283 (BM, K)

NYASALAND

Namuli, Makua country, *Last s.n.* (K). Shire Highlands, near Blantyre, *Last s.n.* (K).

ANGOLA

Angola, *Gossweiler s.n.* (BM). Malange, Cataracta Duque de Bragança, *Carisso* & *Mendonça* 69 (BM). Pundo Andongo, *Welwitsch* 152 (BM).

Soba Quijima, forte Uije, *Gossweiler* 7362 (BM).

NORTHERN RHODESIA

Kasomo, nr. Lake Bangweolo, *Fries* 804 (BM). Mwinilunga district, *Milne Redhead* 3437 (BM, K).

TANGANYIKA

Kasulu, *Tawney* 9855 (K). Kyimbila, *Stolz* 547 (K).

BELGIAN CONGO

Kisungu, *Callens* 2645 (K). Trumu, *Bequaert* 4881 (BR). Lukapu, *Kassner* 2644 (BM). Mt. Morumbe, *Kassner* 2947 (BM, K).

CAMEROONS

Ambas Bay, *Mann* 788 (K). Station Johann-Albrechtshöhe, *Staudt* 475 (BM, K).

NIGERIA

Wana, Mada Hills, *Hepburn* 95 (K).

UGANDA

Budongo, *Eggeling* 2117 (BM), *Eggeling* 2024 (K). Budongo Forest, *Eggeling* 1559 (K), *Sangster* 125 (BM). Sonso R., Budongo, *Eggeling* 2295 (BM). Budamu, Tororo, *Maitland* 1312 (K) Bunyanguru, Ankole, *Purseglove* 843 (K). Bungayabo, Toro, *Snowden* 98 (BM, K) (juvenile). Bunyoro, *Sangster* 166 (BM). Elgon district, *James s.n.* (K). Mt. Elgon, *Snowden* 788 (BM, K), *Snowden* 789 (K). Fort Portal, Nyakasura School, *Thompson* 73 (BM).

SUDAN

Lado, Yei River, *Sillitoe* 115 (K).

KENYA

Sotik district, Chepalungu Forest, *Gardner* 2537 (K).

5. **Pyrrosia Liebuschii** (Hieron.) Schelpe comb. nov.

Cyclophorus Liebuschii Hieron., Engl. Jahrb., 46, 398 (1911); C. Chr., Ind. Fil., Suppl. I, 22 (1913).

Rhizome creeping, 1 mm. diam., paleaceous, bearing fronds at intervals of 2—4 mm. Rhizome scales ovate lanceolate, entire, with a marginal velum, apex acute-acuminate, up to 2·6 mm. long and 1·0 mm. broad. *Stipe* 1—5 mm. long, ± 0·8 mm. diam., more or less tomentose when young, becoming glabrous with age. *Frond* simple, linear, often terete by inrolling of the margins, tomentose below, more or less glabrous above, 2·0—15·4 cm. long, 0·15—0·25 cm. broad, apex acute, base narrowly decurrent-cuneate, margin plane (or frond inrolled). Tomentum grey composed of uniform stellate hairs whose arms are short and flattened. Hydathodes present, appearing as white dots along the margin of the dorsal surface of the frond. *Sori* emergent through the tomentum at maturity, usually confined to the upper two-thirds of the frond. *Spores* smooth 65 $\mu \times 42\ \mu$.

P. Liebuschii is distinct among the African species of *Pyrrosia* with its small narrowly linear fronds. It occurs amongst mosses on rocks and on tree-trunks in the Usambara Mountains in Tanganyika where it appears to be endemic.

Type Locality

Tanganyika, Usambara, near Lutindi, *Liebusch s.n.* The type specimen is thought to be at Berlin and not available at present.

Distribution

TANGANYIKA

Amani, *Braun* 736 (K), *Glynne* 244 (K), *Greenway* 1031 (BM, K), *Verdcourt* 148 (BM). Amani, Sigi Valley, *Greenway* 1755 (K), *Braun* 780 (BM). Sigi Valley, Kwamkuja Falls, *Braun* 736 (BM). Amani, *Warnecke* 328 (BM, K). East Usambara, Kwamkuyu Valley, *Peter* 7979 (BM, K). East Usambara, *Peter* 16845, 19887 (K).

6. **Pyrrosia lanceolata** (L.) Farwell

Pyrrosia lanceolata (L.) Farwell, Amer. Midl. Nat., 12, 245 (1931); Ching, Bull. Chin. Bot. Soc., 1, 70 (1935). *Acrostichum lanceolatum* L., Sp. Pl., 1067 (1753). *Candollea lanceolata* (L.) Mirb. in Lamk. & Mirb., Hist. Nat. Veg., 5, 89 (1803). *Polypodium spissum* Bory ex Willd., Sp. Pl., 5, 246 (1810). *Cyclophorus spissus* Desv., Berl. Mag., 5, 301 (1811); C. Chr., Ind. Fil., 201 (1905) cum syn. *Niphobolus spissus* (Bory

ex Willd.) Kaulf., Enum. Fil., 126 (1824); Giesenhagen, *Niphobolus*, 204 (1901). *Polypodium pertusum* Hook., Exot. Fl., 2, t. 162 (1825) (partim). *Polypodium vittarioides* Wall., (nomen) List, n. 270 (1828); Mett., *Polypodium* n. 256 (1857). *Niphobolus vittarioides* (Wall. ex Mett.) Pr., Tent., 202 (1836); Engler & Prantl, Nat. Pfl., 1, 4, 325 (1902). *Cyclophorus vittarioides* (Wall. ex Mett.) Pr., Epim. Bot., 129 (1849). *Niphobolus fissus* Bedd., Ferns S. Ind., t. 184 (1864) (non Bl.). *Polypodium adnascens* pt. auctt., Hook & Bak., Syn. Fil., 349 (1867); Clarke, Trans. Linn. Soc., II, Bot., 1, 552 (1880). *Niphobolus adnascens* Bedd., Handb., 325 (1883) (non Spr.). *Niphobolus lanceolatus* (L.) Trim., Journ. Linn. Soc. (bot.), 24, 152 (1886). *Niphobolus Giesenhagenii* Christ, Ann. Cons. Jard. Bot. Geneve, 7—8, 330 (1905). *Cyclophorus Giesenhagenii* (Christ) C. Chr., Ind. Fil., 199 (1905). *Cyclophorus spissus* (Bory) Desv. var. *continentalis* Hieron., Engl. Jahrb., 46, 399 (1911). *Cyclophorus lanceolatus* (L.) Alston, Journ. Bot., 1931, 102 (1931); C. Chr., Ind. Fil., Suppl. III, 65, (1943).

Rhizome widely creeping, 1·0—1·5 mm. diam., paleacous, bearing fronds at intervals of 1·0—3·0 cm. Rhizome scales pale brown to grey, linear-lanceolate, ciliate, up to 4 mm. long and 0·8 mm. broad. *Stipe* 0·1—1·8 cm. long, 1 mm. diam., tomentose when young becoming glabrous with age. *Frond* simple, linear to lanceolate or narrowly elliptical, appressed-tomentose below, more or less glabrous above, 3·5—16·4 cm. long, 0·5—1·5 cm. broad, apex narrowly acute to rounded, base cuneate, margin usually narrowly reflexed. Tomentum pale brown or grey, composed of uniform stellate hairs with short flattened arms. Hydathodes apparently absent. *Sori* emergent through the tomentum, confined to the upper half of the frond. *Spores* verrucose, 72 μ × 39 μ.

P. lanceolata is easily distinguished from the other continental African species by its widely creeping slender rhizomes clothed in lanceolate ciliate scales. Hieronymus (1912) segregated the African specimens under the variety *continentalis* on the grounds that the rhizome scales were more longly ciliate than in the type. These cilia vary considerably in length (10—54 μ) and consequently his variety is not recognised here.

Besides having a wide distribution in continental Africa, this epiphytic species also occurs in Madagascar, Ceylon, India and China. The Bourbon plant of this species group, segregated under *Cyclophorus tener* (Fée) C. Chr., may be distinct, but an inadequate range of material prevents any definite conclusions.

TYPE LOCALITY

"Habitat in India" (Ceylon). The type specimen is in Hermann's herbarium (I. folio 3) in the British Museum (Nat. Hist.), London. Another specimen is in the Linnean Herbarium apparently acquired after the publication of the "Species Plantarum".

Distribution

PORTUGUESE EAST AFRICA

Manica e Sofala, Cheringoma, Serraçao de Durundi, *Torre* 4189*a* (BM). Mile $10\frac{1}{2}$, Trans-Zambesi Railway, *Honey* 688 (K).

TANGANYIKA

Amani, *Glynne* 238 (K), *Greenway* 756 (K), *Warnecke* 317 (BM). Amani, Sigi Sangali, *Verdcourt* 149 (BM). Sigi to Longusa, *Peter* 24633*a* (BM). Morogoro, *Leroy* 605 (K).

BELGIAN CONGO

Wendje, environs de Coquilhatville, *Lebrun* 987 (BM, BR).

CAMEROONS

Barombi, *Preuss* 284 (BM). Tiko, *Dunlap* 179, 243 (K).

PRINCIPE

Principe, *Quintas* 30 (BM).

UGANDA

Kipayo, *Dümmer* 788 (BM).

7. **Pyrrosia Stolzii** (Hieron.) Schelpe comb. nov.

Cyclophorus Stolzii Hieron., Engl. Jahrb., 46, 396 (1911) errore *Stoltzii*. *Niphobolus Stolzii* Hieron. Veg. d. Erde, 9, Pflanzenwelt Afrikas, 2, 1, 55 (1908) errore *Stoltzii*.

Rhizome creeping, 1·5 mm. diam., paleaceous, bearing fronds at intervals of 1 cm. Rhizome scales brown, dull, lanceolate, sub-entire below, ciliate above, up to 1·9 mm. long and 0·6 mm. broad. *Stipe* 5·1—9·5 cm. long, 1—1·5 mm. diam., tomentose when young, becoming glabrous with age. *Frond* simple, lanceolate, oblanceolate or elliptical, tomentose below, glabrescent above, 12·8—25·2 cm. long, 1·5—3·2 cm. broad, apex acute, base narrowly cuneate-decurrent, margin plane. Tomentum grey, composed of two kinds of stellate hairs, the larger stellate hairs with fairly straight slender arms up to 0·7 mm. long standing above more numerous smaller whitish hairs with twisted and matted arms. Hydathodes present, appearing as whitish spots on the dorsal surface of the frond. *Sori* emergent through the tomentum at maturity, occurring over the whole or only over the upper part of the frond. *Spores* smooth, 78 $\mu \times 46\ \mu$.

P. Stolzii is the only known continental African *Pyrrosia* with dimorphic stellate hairs in the frond tomentum. *Pyrrosia madagascariensis** (C. Chr.) Schelpe comb. nov., a Madagascar species with dimorphic hairs in the tomentum can be distinguished from *P. Stolzii* in that it has subulate, shining brown rhizome scales up to 5 mm. long. Also the tomentum of *P. madagascariensis* has a ferrugineous colour, not whitish as in *P. Stolzii*.

* Cyclophorus madagascariensis C. Chr. in Dansk. Bot. Ark. 7,161 (1932)

This epiphytic species is only known from two localities in the Nyassa district of Southern Tanganyika.

Type Locality

Tanganyika, "Nyassa-gebiet, Kondeland", near Lungwe, 1450 m. *Stolz* 96. The type is thought to be at Berlin and not available at present. A photograph of the type specimen is in the British Museum (Nat. Hist.), London.

Distribution

TANGANYIKA

Niassa Hochland, Kyimbila, *Stolz* 891 (BM, K).

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HERBARIUM ABBREVIATIONS

Lanjouw (1932) in *Chronica Botanica*, 5 2/3, has been followed in the choice of herbarium abbreviations.

BM	British Museum (Nat. Hist.), London.
BOL	Bolus Herbarium, University of Cape Town, Cape Town.
BR	Jardin Botanique de l'État, Brussels.
CTM	South African Museum, Cape Town.
K	Royal Botanic Gardens, Kew.
NH	Natal Herbarium, Durban.
NU	Dept. of Botany, University of Natal, Pietermaritzburg.
OXF	Fielding Herbarium, University of Oxford, Oxford.
PRE	National Herbarium, Pretoria.
TRV	Transvaal Museum, Pretoria.

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HENRI GEORGES FOURCADE

HENRI GEORGES FOURCADE, D.Sc., F.R.S. (S. Afr.)

Henri Georges Fourcade came to South Africa from France, as a lad of sixteen or seventeen, probably early in 1881. The first official mention we have of him is by the Superintendent of Woods and Forests for the Cape of Good Hope at Knysna in 1882—"I have found another valuable assistant in Mr. Fourcade, who, after the theoretical examination for Land Surveying in this Colony, spent several months studying Forestry, and preparing maps in my office. While there he had charge of my Forest Herbarium and collected seeds, etc. of indigenous trees. With the help of two auxiliaries, thus prepared, the Conservator at Knysna has been able to begin the division of his Forest into series and into sections."

The Superintendent was the Count de Vasselot de Regnier of the French Forest Department, recently appointed for a given period, when Parliament had been aroused at last to give its gravest consideration to the perilous state of affairs in the valuable Cape forests, where thriftless and unsystematic working had resulted in the complete destruction of many forests and the grievous impoverishment of many more. Captain Harrison was the Conservator and Messrs. Rawbone and Fourcade the "two auxiliaries" or District Forest Officers—"my able and most willing assistants".

One pictures the young Fourcade "with new-fledged hope still fluttering in his breast" (to quote Wordsworth, in later years his favourite English poet), fortified by the excellent training received from so eminent a specialist as the Count, and delighted at playing such an important part in the newly organized scheme of management. Moreover, he had all the excitement and fun-of-the-fair, ordered exactly to his liking, with ample scope for his outstanding ability, and a salary of £200—£300 a year, which was no mean one for that time. The old families of those parts soon welcomed "the brilliant young Frenchman" to their homes and genial social entertainments, and life-long friendships were

begun. One of the stories told of him in those early days describes how he arrived one night desperately late for the meal and weary with walking because, as he told his anxious host (with more of logic than idiom) "the horses knocked down". It was in much happier circumstances, however, that, bowing low to the appropriate guest, he offered—"a pair of pears for a peerless lady".

In 1885 the Conservator of Forests, Midland Conservancy, appended to his report a report by Fourcade himself, describing his work as—the supervision of timber sales, the regulation of yield, and the surveying of forests in the West Knysna district. He also listed the names of 75 collections of indigenous trees he had made for the forest department's herbarium, and later he was specially commended by the Conservator for his good work.

In 1888—1890 Fourcade was—"at the instance of the Natal Government detached to report on the forests of Natal and submitted a most comprehensive report with valuable recommendations and much original matter on Cape timbers not available elsewhere." (Sim—"Forest Flora".)

From 1891—1899 he was employed specially on the demarcation of forests, his duties being those of a surveyor, and in 1901 he is mentioned as having prospected two alternative road-routes from the harbour at Storms River Mouth to Assegaaibosch. After this he seems to have passed entirely into the Surveyor-General's Department. His colleagues and contemporaries were convinced that as far as experience and ability were concerned he was pre-eminently the right man for the post of Surveyor-General; but they feared he had not always been as discreet as becomes a civil servant, and that his disputative logicality would prevent his appointment. (One story they tell is of a dispute with his chief carried on by letter. When the latter considered it had gone on long enough, Fourcade was bidden to "stop wasting government stationery." He obeyed, and continued the correspondence on his own stationery!). When the post fell vacant he was passed over. There is no doubt he was bitterly disappointed and felt the Government had not treated him fairly. But with innate fortitude and resourcefulness he said goodbye to all that in 1913, retired from the Civil Service, sold his surveyor's instruments, opened a general dealer's store, set up a sawmill, and proceeded as a registered "bush worker" to work the timber on his own property at Witte Els Bosch, which became his home for the rest of his life. Four years later he told Sir Alec Carlson he had made "a lot of money". Later in one of his letters to me he wrote—"I am leaving tomorrow for a wooded mountain farm I have in Long Kloof whereon I must lay out roads and a tramway track for working the timber. This is rather a big job which will leave me no leisure for plant-determinations.

But I shall have fine opportunities for collecting and will send you a parcel or two direct if I may."

It must have been from these enterprises that the large sum (£78,000) bequeathed to the University of Cape Town was derived in the first instance. For Fourcade apparently became a sound business-man and made wise investments, so that his failure to secure the coveted post in the Civil Service became the University's immense gain, and inevitably one recalls Milton's fine lines:—

"All is best, though we oft doubt
What the unsearchable dispose
Of highest wisdom brings about,
And ever best found at the close."

With the advent of aeroplanes Fourcade realized the important part to be played by aerial photographic surveying and began working out the problems involved therein. His first paper—"On a Stereoscopic Method of Photographic Surveying" was read before the S.A. Philosophical Society in 1901. Other papers followed on the same subject and on the instruments to be used, his greatest achievement in this latter direction being the construction of an apparatus to translate aerial photographs into plans having the right projection. He was asked how he had succeeded where so many had failed and replied, "There were three dimensions to be considered. Others tried to solve the problem one dimension at a time whereas I tackled all three dimensions at once." The patent rights of this instrument were acquired by the British Government and it was said to have been "widely used in the survey of Burma and other heavily wooded territories of the Empire."

Fourcade found the War Office "the most difficult of all buildings to enter, but once your credentials were approved and you were known you could come and go at will, seeing many world-famous men and brushing shoulders with them in the corridors." He must have thoroughly enjoyed this contact with intelligences equal or superior to his own; for here we could only admire him from a distance as "being a very learned man whose writings were quite beyond us."

Indeed, there seems little hope of any one mind being able to grapple with the many dimensions of this remarkable and versatile man's range "all at once", as he had "tackled the three dimensions" in the construction of his famous instrument. It was easy enough for Charles Lamb, in his inimitable manner, to distinguish his "works" (the numerous ledgers he had filled during his 35 years in the service of the East India Company) from his "recreations" (the immortal "Essays" and other literary productions); but in Fourcade's case the "works" often became "recreations", and these with his hobbies would develop into works.

For his was always the unhurried and brooding way that would avoid surfaces and penetrate the depths, ever conscious of the more that was still to be known. It was for his outstanding work as a mathematician and surveyor and for his contribution to South African botany that he was made a Fellow of the Royal Society of South Africa in 1927, and that he received the honorary degree of Doctor of Science from the University of Cape Town in 1930.

Much of this work involved long periods of hermit seclusion in lonely places which provided ideal conditions for the prosecution of his many other mental activities. But in 1920–1921 there came a change and the "recluse" returned to civilisation. After a lapse of ten years he called on some very old friends "for a few minutes". These were lengthened to several days, with delightful expeditions in his car to introduce other visitors in the house to some of the beautiful scenery he knew. This was after his decision to join in the Botanical Survey of the south-eastern Cape Province and to concentrate on a "Check List of the Flowering Plants of the Divisions of George, Knysna, Humansdorp and Uniondale." He had begun this actually on his own account much earlier, the first collection recorded in his botanical register being dated July 1905, and he wrote to me in 1921—"At first I limited my collecting to the Zitzikama, bounded by the Keurboom and Krom Rivers, but later agreed to include any plants I might be able to collect in the districts of George, Knysna, Uniondale and Humansdorp, this being the area Dr. Schonland mapped out for the next regional list of the Botanical Survey."

This large area of 5,429 sq. miles, with most of which he was already so familiar from another angle, was now to be explored in the minutest detail and under very different conditions. The car simplified operations considerably, and it was a joy to be following in the tracks of the early travellers and indulging in the fancy that he might be collecting from the same old tree as, say, Burchell had done more than a hundred years before. Certainly the collecting was the most congenial part of the task he had undertaken, especially when all went well, as in October 1921—"I had a very pleasant trip round by Knysna and George with fine weather, a car that ran without a hitch, and the hospitality of old friends." But in December 1927 things went ill—"I set out early this month on a collecting tour, but 'the best laid plans . . .' and on the second day I was pulled up by finding something wrong with one of my eyes. Being near Humansdorp at the time, I consulted a local doctor who despatched me to a specialist in Port Elizabeth who found an effusion into the vitreous and told me to go home at once and remain in a dark room for at least a week if I did not want to lose the sight of that eye. I have now remained in a dark room for over a fortnight. The condition

of the eye is improving and there is every prospect of recovery. But I shall have to use my eyes as little as possible for the next few months and will be unable to continue attempting determinations, so that, if I may, I shall have to send you a larger proportion than formerly of the plants I come across . . . I am tired of inaction and propose to resume my ramble tomorrow. I hope that, taking due care of my eyes, it will not be cut short again."

There was bad luck again in October 1932—"My recent tour was rather unfortunate. It began raining on the second day, and off and on there fell up to 20 inches in some parts before I returned home. What with flooded rivers, impassable roads and bad weather, I found it impossible to carry out my original programme, and, to crown it all, when half through I sustained severe internal haemorrhage which alarmed the doctor at Knysna, where I was rushed into, but I recovered more quickly than he had thought possible and after a week he allowed me to go home by easy stages, with strict injunctions not to exert myself, which has put a damper on my plans for collecting this season, after having lost three through being in England . . . Anyhow the tour seems to show that I am far from having reached finality. I found over 100 species which I had not collected before and a considerable number of these appear to be new."

In January 1933—"I recently ran up to Olifants River Warm Baths in the Kamanassie Karroo with the idea of finding Thunberg's Mesemb. truncatum which he collected there in January or February, but although for two or three days a boy and I went over the ground with the fine-tooth comb (or is it fine tooth-comb?) which journalists carry when they explore avenues and leave no stone unturned, I saw nothing resembling the Kew drawing of Thunberg's type." Then after setting out "to collect vigourously" he was disappointed to find that "veld burning, increase of grazing, the spread in some areas of pests like Rhenoster and Prickly Pear, and the operations of the Forest Department in others have combined to reduce enormously the occasion of the more uncommon species, even during the limited period I have known these districts. Last month (November) I went down the Montagu Pass, once upon a time described as a "botanical paradise" but now burnt bare year after year by the Railway people, and spent a whole day searching its slopes with the help of a boy, without finding a single plant to collect, although I have not yet collected perhaps half the number of species which have been recorded from the Pass." Strenuous, however, and disappointing as the collecting often was, and tedious the drying and ticketing of specimens for his own herbarium and of many more for distribution to other herbaria, Fourcade was faced with far more formidable obstacles (greater

then than they would be now) in connection with identifications. These involved the careful verification or correction of existing identifications as well as the naming of his own collections—all increased by the inaccessibility of literature and of the old types overseas. Then there were disheartening delays in getting the descriptions of his new species published, surely a combination of hindrances that might have proved insurmountable to a less patient and determined worker.

Naturally we were all prepared to help as far as we possibly could, knowing how essential and fundamental was the information supplied in this Check-List for all "future work on the veld-management of these parts"; but our help was quite insignificant, and he had to struggle with nearly all the problems himself to their bitter end. In July 1934 he seemed to be bracing himself up for the final attack—"Having reached man's allotted span of three score years and ten, I feel that it is high time that I should complete various bits of work I have been engaged upon, and one of them is a list of plants of my region on account of which I have already paid three lengthy visits to Kew and propose paying a fourth early next year. . . . If you can help further by contributing descriptions there should be no difficulty in arranging for their publication by the Royal Society of South Africa, as I am quite willing to bear the cost. In fact I have been so impressed by the financial obstacles to the publication of scientific work in this country that I have decided to leave a substantial share of my pennies to establish a fund for subsidizing the publication of suitable work by the Royal Society of S.A. and the Bolus Herbarium." Earlier (June 1933)—"The continued withholding of the publication of certain of your species in the Kew Bulletin, is unpleasant. On September 15th when I took the descriptions to Sir Arthur Hill he professed that he would have much pleasure in finding room for them in the Bulletin, and during the whole of my stay in England he was very civil to me, so that I do not think that the obstruction, if any, comes from him. The prospect of publication seems as remote now as it was in 1931. If time allows, one course—not very satisfactory—would be to ask Sir Arthur Hill to kindly return the descriptions in order to take advantage of the opportunity of including them in your forthcoming papers. If too late, the only thing to do is to go on waiting—equally unsatisfactory."

During his visits to the Bolus Herbarium we found Dr. Fourcade the ideal student, handling plants and books with the greatest care and showing every consideration for the other workers—a shining example to the rest of us. We were all impressed with his utter sincerity and selflessness. He dreaded giving unnecessary trouble and one was often touched by his courtesy and humility—"I hope you will kindly allow

me to work at the Bolus Herbarium. . . . I shall realize how busy you are and will not disturb you lightly." ("and will not disturb you lightly" —surely this is like something "the angel of hearing loves to caress and murmur over and over again.") Much later, in his eightieth year, he was distressed on our account—"Very many thanks for the determination of the plants I sent you last. I find, to my dismay, that I had good matches for four of them, the identifications of which I should not have troubled you about. This reveals the mental inertness I have been in and I must apologize for the unnecessary work given to your busy staff. I shall now be on my guard against my limitations and try to be more careful in future. Many thanks again."

Every service, too, would be acknowledged in generous terms— "I must thank you very much for supplying the names of the heaths submitted to you. I think it is quite a feat to have determined them all when so many were in such a poor condition." And he would mention, if it were a joint report, each contributor by name—"I am much obliged, too, to Miss Barker, Miss Leighton, Miss Lewis and Mr. Pillans for their shares in the work." Nor would he lose a chance of slipping some additional praise in edgeways—"I compared several hundreds of my specimens at Kew and was able to add largely to their correct naming. Very few of those which had been named at the Bolus Herbarium were found to disagree." And again in acknowledging a presentation—"The book will always remind me of the pleasant and instructive days I spent in the Bolus Herbarium and of the generous assistance I met from all whenever I was in a difficulty." Yet all the time his valuable contributions of plants to the Herbarium were an ample recompense for what we did, and his gratitude was just the genuine appreciation of a worker for the work of others.

The Check List was completed for publication at the end of 1939 and appeared as Memoir No. 20 of the Botanical Survey of South Africa in 1941. Nearly 3,000 native species are recorded, sixteen of which bear his name, and 166 aliens. But supplementary collecting still went on, in spite of failing health. There were "sessions" in the nursing-home and during one of these (May 1943) Dr. Fourcade wrote—"I cannot exactly say that I am better, I have to continue experimental treatment and to rest as much as possible and do very little for months yet before I can hope to be tolerably well again . . . and there are no prospects of my doing much botanical work in the near future. I still glean, however, alongside roads I have to travel."

There was a triumphant letter later when he and Miss Esterhuysen had joined forces—"About 220 species not represented in my herbarium have been added to it since October 1941. Of these Miss Esterhuysen

contributed about 73, named and unnamed, and myself about 93, but I spread over 14 months what she did in a month, and her collections are more valuable than mine because they include more new species or more new additions to my list. Several hundred specimens have also been mounted which I had already, but only from other districts of my region."

During the war he was greatly distressed by the turn of events in France and refrained from discussing "the hopeless situation."—"I am much obliged to you," he wrote "for sending me Dr. Leipoldt's fine sonnet on France which I have read with great appreciation. My hope and trust are that he may prove to have been a true prophet."

Among his later publications was an important one in "The Transactions of the Royal Society" (read in June 1941) entitled—"Some Notes on the Effects on the Incidence of Rainfall over the Surface of Unlevel Ground." The special rain-gauge he invented is now used in Jonkershoek.

Another excellent paper, published in "The Journal of South African Botany" and dated April 1944, takes us back once more to his own familiar area. These "Notes on Burchell's Catalogus Geographicus, *Middle Portion*," accompanied by photographs and accurate maps, are most instructive and valuable in fixing the exact localities in a modern map of Burchell's famous collections in those parts.

As far as space would permit I have quoted extracts from Dr. Fourcade's letters to me (over a period of some 26 years), as showing what manner of man he was. For the last thing he ever wanted to do was to talk of himself and his "own mysterious and many-flowered altars," and this reticence in one of so sensitive a nature may have been often misunderstood. Most of his friends, for instance, were unaware of his love for poetry, and that he could be surprised even into quoting Wordsworth and Walt Whitman on rare occasions. Writing of a friend who had passed on, he said—"My memory of him shall live as that of a kind and considerate man who was too modest to obtrude his fine abilities." All this could well be included in our memory of Dr. Fourcade. Most of the rest, one feels, he would gladly leave where Milton so gloriously placed it:—

> "Fame is no plant that grows on mortal soil,
> Nor in the glistering foil
> Set off to the world, nor in broad rumour lies,
> But lives and spreads aloft in those pure eyes,
> And perfect witness of all-judging Jove;
> As he pronounces lastly on each deed,
> Of so much fame in Heaven expect thy meed."

The end came in January 1948; he died on the 19th in the hospital at Humansdorp, where he is buried. Everything he had was bequeathed to the University of Cape Town. The "pennies" alluded to in one of his letters quoted here amount to an annual sum of several hundred pounds, sufficient to finance the publication of a goodly number of scientific papers each year. His precious herbarium, arranged in accordance with his List, in its beautifully made cabinets of rooi els wood (*Cunonia capensis*) is now an integral part of the Bolus Herbarium. It occupies a bay opposite the entrance door together with his dining table and chairs, also made of wood from the forest—stinkwood and yellowwood (*Ocotea* and *Podocarpus*). Some of his pictures, depicting scenery near Knysna, are on the walls, and the whole is something like a reincarnation of a part of the home that knew him at Witte Els Bosch.

L. Bolus.

Bolus Herbarium,
University of Cape Town.

BOOK REVIEWS.

THE ORIGIN, VARIATION, IMMUNITY AND BREEDING OF CULTIVATED PLANTS. By N. I. Vavilov. Translated by K. Starr Chester. Pp. 1-366 with 37 illustrations. Waltham, Mass.: The Chronica Botanica Co. London, W.C. 2: Wm. Dawson & Sons, Ltd. $7·50.

In his all too short lifetime N. I. Vavilov made many important contributions to the study of plant life. His unbounded energy coupled with a keen and original mind, combined to make him one of the foremost scientists of his age. The world at large is infinitely the poorer for his premature death which is presumed to have occurred early in 1942. Though Vavilov had a mastery of many languages it is natural that most of his publications were made through the medium of Russian, his mother tongue. On this account many of his important contributions to science have remained inaccessible to the majority of scientific workers. The present volume is therefore sure of a welcome for Vavilov's writings have more than an ephemeral interest. His contributions to plant breeding, the origin of cultivated plants and many kindred subjects are well known, but here for the first time they are made available to English-speaking students in their entirety.

The longest of the five papers in this volume is "The Scientific Bases of Wheat Breeding". In this the author has dealt exhaustively with a subject in the development of which he played a leading part. Next in size comes "Study of Immunity of Plants from Infectious Diseases", another subject of great practical importance to agriculture. The remaining papers are shorter but they too deal with topics of interest. One entitled "The Law of Homologous Series in the Inheritance of Variability" may be read with advantage by every student of plant life. It is a law so simple and yet so significant for workers on plant classification that one feels surprised at the neglect it has so often suffered in the past. Vavilov's first communication on this subject was made in English in the *Journal of Genetics* in 1922. In the volume under review the translation has been made from a Russian version written in 1935 and incorporating some new material.

There are a few minor criticisms. A statement of the place and date of publication of each paper would have added to the general interest. Some of the illustrations are less good than they were in the original, probably largely due to the fact that in these cases the originals were in colour and the present ones are not. Fig. 3 loses much of its clarity when reproduced in black and white. The same is true of the map given in

Fig. 8: in the original the centres of origin of cultivated plants stand out clearly but here they are obscured by the rather heavy shading used to indicate altitudinal differences.

These criticisms, however, are of slight importance when considering the volume as a whole. Serious students are much indebted to the Chronica Botanica Co. for making these classics of the scientific world available in such an excellent translation.

M. R. Levyns.

Botanical Survey of S. Africa. Memoir 23. The Vegetation of Weenen County, Natal. By O. West. 1950. Memoir 24. An Ecological Account of the Vegetation of the Potchefstroom Area. By W. J. Louw. 1951.

It is a matter of some importance that accounts of the vegetation of two important agricultural districts in the country should appear in close succession and one hopes that this may be an augury that more scientific methods may become used in the management and exploitation of the veld instead of the too common short-sighted and destructive procedures so often followed.

The two areas described in these papers are alike in that grassland forms the main vegetation type but otherwise are dissimilar in the topography, climate, and relationships of the vegetation. In both papers rather full accounts are given of the local topography, geology, and climate. In West's paper these data are especially full and include under climate a number of most useful features which are not often available.

(1) West's paper on Weenen county is undoubtedly a real contribution to the understanding of vegetation and its management. The area is essentially a series of steps on the eastern slope of the Drakensberg escarpment descending from the mountain tops to the river valleys at about 3,000 ft. Within the area three main vegetation types are recognized, Alpine, Evergreen (Mountain) Forest, and Semi-deciduous Bush. In the treatment of these attention is focussed on the history of the area and the activities of the human population both native and other. It is a matter of interest and importance that the author reaches the conclusion that grassland with the possible exception of the alpine types, is derivative and dependant on interference either by fire or by grazing or both. Evidence in support of this was obtained from direct observation and from the results of a number of long-term experiments. The account of the grassland in this paper and of its relations is both full and clear. Throughout the paper stress is laid on the dynamic aspects and the relationships to management.

The paper is illustrated by a large number of photographs which have been carefully selected but of which the reproduction is in many cases so poor that details are obscured.

(2) The paper by Louw on the Potchefstroom area is, in spite of its more high-sounding title, a much slighter and less important one. The treatment throughout is rather static with emphasis on floristic and some biological aspects. There is little on the relationships of the vegetation itself. The description is based on the main habitat conditions but the dynamic side is not brought out. Some attention is given to the deterioration resulting from burning, overgrazing or faulty methods of farming, but this aspect is not given the amount of detail that its importance would warrant. The discussion on economic and agricultural aspects is much lacking in this direction. The illustrative photographs are good and in general are better reproduced than in the other paper.

It is a matter of slight regret that neither author includes a vegetation map. West gives an orographical one, Louw a topographical, an orographical and a geological one. A map illustrating the existing condition of the plant communities would have made the findings much clearer to the reader with no local knowledge.

R. S. Adamson.

An Introduction to the Embryology of the Angiosperms. By P. Maheshwari. New York, Toronto, London. McGraw Hill Book Co. 1950. Pp. x+453, figs. 216. 52/–.

Plant Embryology: Embryogeny of the Spermatophyta. By D. A. Johansen. Waltham, Mass.: Chronica Botanica Co. Johannesburg: Central News Agency. 1951. Pp. xviii+306, figs. 80. $6.00. (Special interleaved half-leather-bound edition $14.00.)

It is strange that since Coulter and Chamberlain published their classical text book *The Morphology of Angiosperms* in 1903, no comparable synthetic study in English of the embryology of the flowering plants has been written until the present two volumes, both of which have appeared during the last two years.

Maheshwari's book follows the Coulter-Chamberlain plan rather closely, and covers all the developmental processes of the male and female gametophytes, fertilization and the early stages of the formation of embryo and endosperm, as well as giving some account of such relevant subjects as the structure of the style, nucellus and integuments, etc. Johansen's book, on the other hand, deals strictly with embryogeny: that is, the early development of the embryo itself, starting from the zygote.

Johansen's book, with its narrow scope, goes into the details of successive cell-divisions in the embryo, and puts forward a system of

classification of types of embryogeny, largely based on Schnarf and expressed by shorthand formulae. The sequence and direction of the early segmentations of the zygote are the principal theme of the largest section of the book, viz., that dealing with the Anthophyta: and a number of "embryonomic laws" governing early development are stated. Six principal Types are distinguished: in one of these, the Piperad Type, the first cell wall is "essentially longitudinal"; in the other five types it is transverse. In two of these the terminal cell divides by a longitudinal wall, in the other three by a transverse wall: the varying behaviour of the basal cell being the criterion for their further classification. These Types are subject to many Variations, based on subsequent cell-divisions.

While this formal mode of classification may be useful in dealing with descriptive embryogeny, it appears to bear very little relationship to Angiosperm systematics in the wider sense. Johansen arranges his subject matter under families: but several distinct Types and Variations may occur within any single family: for example, the few Gentianales which have been studied fall into three of his Types—the Solanad, Caryophyllad and Asterad. Conversely, each Type occurs in widely separated parts of the natural system: for instance the Onagrad Type has Variations named after such diverse genera as Capsella, Euphorbia, Lythrum, Mentha, Lotus, Catalpa, Lilium and several others. Clearly, embryogeny can only be used as an indication of relationship with the greatest caution.

A valuable section of Johansen's book deals with the Gymnosperms, whose embryogeny has a peculiar interest which is not, perhaps, shared by the Angiosperms. Here we do not find the same obsession with Types, and the descriptions and illustrations are clearer and more objective. The larger section on the Angiosperms is useful as indicating the studies that have been made and calling attention to the gaps in embryological knowledge of that vast group: but the impression is given that no sensational results are likely to follow from the filling of the gaps.

The book as a whole is a thoroughgoing descriptive account of a special field, unillumined by experimental study or phylogenetic theory: as such it will serve for reference rather than for stimulus.

Maheshwari's volume, with its much wider subject matter, may be regarded as a text-book of comparative morphology, and as such it merits very high praise, from the standpoints both of the advanced student and of the research worker. It is a very readable survey, selecting what is essential and presenting the various phases of life history with admirable clarity and succinctness: the figures are numerous, most of them being redrawn in good style and fully illustrating and explaining

the text: the bibliography is copious and references given in the text will lead the student to the original sources of information.

While the greater part of the book is factual and descriptive, the final chapters are noteworthy presentations of the more recent developments in the field.

One chapter deals with the contribution that comparative embryology can make to the perennially interesting and fundamental study of taxonomy and phylogeny. Examples are given of the way in which embryology may settle the systematic position of a genus or family of problematical affinities. The Empetraceae, for example, have been associated by various authors with such diverse families as the Euphorbiaceae, Celastraceae and Ericaceae: embryology definitely establishes their relationship with the Ericaceae. The Cactaceae have been variously associated with the Centrospermae, Passifloraceae and Cucurbitaceae: the embryological data place them in the first group as a sort of bridge between the Aizoaceae and Portulaeaceae.

Another chapter presents the main lines of modern experimental research on embryological phases of life history. Here we find accounts of test-tube cultures of embryos with an analysis of the chemical and physical factors involved: this has been of practical use in securing the development of otherwise non-viable hybrids in Prunus and in accelerating the production of seedlings in Iris hybrids, where a two years resting period usually occurs before germination. Other topics are induced parthenogenesis; the production of adventive embryos; and the induction of parthenocarpy, or fruit formation without fertilization—a subject of great potential economic importance, already realized in the case of winter tomatoes.

A final chapter deals with the theoretical aspects of embryology from the phylogenetic point of view. The Gnetalean origin of the Angiosperms is favoured: the two-archegonia theory of the 8-nucleate embryo-sac is rejected: the endosperm is discussed, but its morphology remains problematical: brief mention is made of the Dicot and Monocot types of seedling, but the Angiosperms are judged to be certainly monophyletic.

Maheshwari's book is an admirable presentation of the subject and should be widely welcomed.

R. H. Compton.

Wild Flowers of the Cape of Good Hope. By E. Garrett Rice and R. H. Compton. With a foreword by Field-Marshal J. C. Smuts. Cape Town. Bot. Soc. of S. Afr., 1951. Pp. 24 and 250 col. plates. 50s.

This is a most delightful and attractive picture book and one which will be very much welcomed by lovers of the beauties of our flora. It consists essentially of 250 coloured plates by Mrs. Garrett Rice. These

plates illustrate no less than 444 species and are drawn life-size. The plates themselves are most pleasing and for the most part are both artistic and accurate. A few suffer from a certain degree of artistic fuzziness in detail. The reproduction is on the whole excellent. There is a certain loss of colour and brilliance especially in scarlet and orange tones. The species illustrated are named, and notes are given on the localities where the plants are found, their form and time of flowering. These notes, together with some details on the origin of the work, are elaborated in the introductory part.

The volume has a characteristic foreword by the late General Smuts. This foreword was, indeed, one of the last things he wrote and will in time to come be looked upon as a valuable part of the volume.

The species illustrated seem to have been collected without any definite plan. They provide a random sample of the more conspicuous part of the flora. This random sampling renders the botanical value of the book negligible but it was not produced for botanists but for that large public which has a general interest in our flora but neither the time nor the desire for detailed study. For these it is very much what has been demanded for a long time.

The Botanical Society is to be congratulated on having undertaken the publication of this book which will surely be prized by a large public. For visitors to the Cape it will be both a most welcome addition to the few works available and a most attractive souvenir. The price for such a book is remarkably low.

R. S. Adamson.

The Genera of South African Plants. By E. P. Phillips. 2nd edition. Pretoria. Bot. Survey Mem. 25. Govt. Printer. 1951. Pp. 923. 40s.

This is a new and enlarged edition of a work well known to botanists and students. The first edition which was published in 1926 has been out-of-print for several years. This new edition is much enlarged, extending to 923 pages as compared with 702 in the original. The general plan is the same as in the first edition and need not be recapitulated. This extends to the extent of quoting the serial numbers of genera used by Della Torre and Harms even where these go against more recent views. The increase in size is in the main due to the inclusion of 114 genera which did not appear in the first edition. Some of these are the result of more intensive exploration of the flora, some the result of rearrangements and the splitting up of older large genera.

Welcome and most useful innovations in this edition are the citations of the sources of the original descriptions, and in most cases the quotation of the type species.

The size of the volume brings out the immense diversity of the South African flora. The most casual study of the notes on the distribution of the genera also emphasizes the very great diversity in the floras of the different parts of the country. When these features are realized, one is forced to admire the courage and energy of the author in attempting the task he has undertaken. In dealing with such a huge and diverse assemblage of plants it is inevitable that a certain degree of inequality of treatment occur and that a certain fraction must be of the nature of a compilation from the work of others. No one can be equally familiar with all the floras in the country, and a reader who is especially familiar with any one will certainly find errors of omission or commission in his special field.

As an example of the diversity of treatment the somewhat excessive splitting of genera in Thymelaeaceae and in the *Mesembryanthemum* group in Aizoaceae stand in contrast to the grouping of genera under *Lobelia* or *Tetraria*.

The author's treatment of genera described or segregated since the first edition is individual. In many cases notes have been added to the descriptions giving an alternative connotation. In others an arbitrary line is taken. For example, several of Lewis' rearrangements in Iridaceae are not accepted; *Acidanthera* which she claimed was not represented in this country is retained. Further in Restionaceae the scheme of Pillans is accepted with no reference to the rearranged genera of Gilg-Benedict. In his preface the author mentions that he has not personally studied the segregates of *Mesembryanthemum*. These which occupy 26 pages are certainly the least satisfactory part of the book.

On the much vexed question of the omission or inclusion of alien genera, again the author takes up an individual line. Many such are included in Caryophyllaceae or in Cruciferae but none in Malvaceae. *Argemone* is included but one looks in vain for *Erodium*.

As however no two systematists agree wholly on any system of classfication, it is an easy matter to find faults. Taking the book as a whole, this edition is undoubtedly a much better work than the original one. An immense amount of trouble has been taken to bring it up to date, an impossible task, and to eliminate errors. A superficial comparison with an annotated copy of edition 1 shows that a large number of errors have been eliminated. The keys both to the families and to the genera in each family have been largely recast. These are based on generally obvious features. In most cases one or at most two contrasting characters are used, an oversimplification which leads to uncertainty in many of the larger families. Especially for students and beginners it would have been an improvement if the key to the families had been sectioned. The

chances of error in a key with 796 divisions and one which extends over 45 pages are very large.

The book is clearly printed and well got up. The type is clearer than that in edition 1. There do not seem an excessive number of misprints. It is certainly a volume that should be in any botanical library in this country and is one that will be a very useful source of reference. For its size the price is reasonable.

R. S. Adamson.

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AN ANNOTATED CHECK-LIST OF THE PTERIDOPHYTA OF SOUTHERN AFRICA.

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AND

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Since the publication of T. R. Sim's *Ferns of South Africa* in 1915, further taxonomic studies have led to nomenclatural changes. Also, recent collecting has led to a number of new records of ferns for Southern Africa. The aim of this paper is to provide a list of the pteridophytes known to occur in Southern Africa embodying these changes and additions. The geographical area considered in this paper includes the Union of South Africa, South West Africa, Basutoland, Bechuanaland, Swaziland, Southern Rhodesia and Portuguese East Africa (Mozambique) south of the Zambesi River.

A number of tropical African ferns have been collected in the northern Transvaal, Southern Rhodesia and Portuguese East Africa. Many of these new records have resulted from the collections made by the late Dr. B. S. Fisher and by Dr. H. G. Schweickerdt. Other new records have originated in collections made in more southerly areas. In the notes appended to this check-list, some short descriptions and references to localities, specimens and the herbaria in which they are housed are given in the case of such new records. Wherever nomenclatural changes have been effected, the reasons for these changes have been given in the appended notes. The numbers in brackets after specific epithets in the list refer to the numbers given to individual notes. Incorrect or invalid names given by Sim (1915) are also given in brackets after specific epithets. A specific epithet enclosed in square brackets indicates that

the species is considered to be an introduced alien. Herbaria containing cited specimens are given in abbreviated form in brackets after such citations. The abbreviations are those proposed by Lanjouw in *Chronica Botanica*, 5, 2/3 (1932).

The arrangement of the Filicales is according to Christensen (1938) in the *Manual of Pteridology*. Reference is made to the more recent arrangement proposed by Copeland (1947) in his *Genera Filicum* which has not yet received universal acceptance in its entirety.

The authors wish to thank Mr. F. Ballard of the Herbarium, Kew, for valuable discussion.

PSILOTALES

PSILOTACEAE

Psilotum Sw.

nudum (L.) Griseb. (1) (*P. triquetrum* Sw.)

LYCOPODIALES

LYCOPODIACEAE

Lycopodium L. (2)

saururus Lam.
gnidioides L. fil.
dacrydioides Bak.
verticillatum L. fil.
ophioglossoides Lam. (3)
clavatum L. (4)
cernuum L. (4)
complanatum L. (5)
carolinianum L.
sarcocaulon A. Br. & Welw. ex Kuhn (6)
(*L. carolinianum* L. of Sim in part)

SELAGINELLACEAE

Selaginella Beauv.

pygmaea (Kaulf.) Alston (7) (*S. pumila* Spr.)
caffrorum (Milde) Hieron. (7) (*S. rupestris* Spr. of Sim in part)
Dregei (Presl) Hieron. (7) (*S. rupestris* Spr. of Sim in part)
Mittenii Bak. (7) (*S. depressa* A. Br. of Sim; *S. Mackenii* Bak.; *S. Cooperi* Bak.; *S. tectissima* Bak.; *S. integerrima* Spr. of Sim)

Kraussiana (Kunze) A. Br.
abyssinica Spring
imbricata (Forsk.) Spring ex Decne.

ISOETACEAE

Isoetes L.
capensis Duthie (8)
natalensis Bak.
stellenbossiensis Duthie (8)
Stephansenii Duthie (8)
Wormaldii Sim

EQUISETALES

EQUISETACEAE

Equisetum L.
ramosissimum Desf.

OPHIOGLOSSALES

OPHIOGLOSSACEAE

Ophioglossum L.
Bergianum Schlecht. (9)
sarcophyllum Desv. (10) (*O. capense* Sw.)
nudicaule L. fil.
reticulatum L.

MARATTIALES

MARATTIACEAE

Marattia Sw.
fraxinea Sm. (11)

FILICALES

OSMUNDACEAE

Osmunda L.
regalis L.
Todea Willd.
barbara (L.) Moore

SCHIZAEACEAE

Schizaea Sm.
pectinata (L.) Sw.
tenella Kaulf.

Lygodium Sw.
Kerstenii Kuhn (12)
scandens (L.) Sw.

Anemia Sw.
Dregeana Kunze
Simii Tardieu Blot (13) (*A. anthriscifolia* Schrad. of Sim)

Mohria Sw.
caffrorum (L.) Desv.
lepigera Bak.

MARSILEACEAE

Marsilea L.
ephippiocarpa Alston (14)
macrocarpa (D.C.) Presl (15)
Burchellii (Kunze) A. Br. (16)
biloba Willd. (17)
nubica A. Br. (18)
trichocarpa Bremek. (19)
villifolia Bremek. & Oberm. ex Alston & Schelpe (20)
(*M. villosa* Burch. ex Bremek. & Oberm.)

GLEICHENIACEAE

Dicranopteris Bernh.
linearis (Burm.) Underw. (21) (*Gleichenia linearis* (Burm.) Clarke)

Sticherus Presl
umbraculiferus (Kunze) Ching (22) (*G. umbraculifera* Kunze)

Gleichenia Sm.
polypodioides (L.) Sm. (23)

HYMENOPHYLLACEAE

Trichomanes L.
melanotrichum Schlecht. (24) (*T. pyxidiferum* L. of Sim)
montanum Hook. (25)
rigidum Sw. (26)

Hymenophyllum Sm.
capillare Desv. (27) (*H. lineare* Sw. of Sim)
fumaroides Willd.
Kuhnii C. Chr. (28) (*H. Henkelii* Sim)
Marlothii Brause
tunbridgense (L.) Sm.
uncinatum Sim (29)

CYATHEACEAE

Hemitelia R. Br. (30)
capensis (L. fil.) Kaulf. (31)
Cyathea Sm.
Holstii Hieron. (31)
Deckenii Kuhn (32)
Dregei Kunze
Thomsoni Bak. (33)

POLYPODIACEAE

Subfam. Dennstaedtioideae

Microlepia Presl
speluncae (L.) Moore
Hypolepis Bernh.
sparsisora Kuhn
Schimperi Hook

Subfam. Lindsayoideae

Schizoloma Gaud.
ensifolium (Sw.) J. Sm.

Subfam. Davallioideae

Davallia Sm.
chaerophylloides (Poir.) Steud.
Nephrolepis Schott
biserrata (Sw.) Schott
undulata (Afz.) J. Sm. (34) (*N. cordifolia* (L.) Presl of Sim)
[**exaltata** (L.) Schott]
Arthropteris J. Sm.
orientalis (Gmel.) Posth. (35) (*Dryopteris orientalis* (Gmel.) C. Chr.)
monocarpa (Cordem.) C. Chr. (36)

Subfam. Oleandroideae

Oleandra Cav.
distenta Kunze (37) (*O. articulata* Cav. of Sim)

Subfam. Pteridioideae

Pteridium Gleditsch
aquilinum (L.) Kuhn (38)

Lonchitis L.
natalensis Hook. (39) (*L. pubescens* Willd. of Sim in part)
stenochlamys Fée (39) (*L. pubescens* Willd. of Sim in part)

Histiopteris J. Sm.
incisa (Thunb.) J. Sm.

Pteris L.
vittata L. (40) (*P. longifolia* L. of Sim)
cretica L.
dentata Forsk.
quadriaurita Retz. (41) (*P. biaurita* L. of Sim)
pteridioides (Hook.) Ballard (42) (*P. brevisora* Bak.)
Buchanani Bak. ex Sim

Actiniopteris Link
australis (L. fil.) Link (43)

Acrostichum L.
aureum L.

Stenochlaena J. Sm.
tenuifolia (Desv.) Moore

Subfam. Gymnogrammeoideae

Ceratopteris Brongn.
cornuta Le Prieur (44) (*C. thalictroides* (L.) Brongn. of Sim)

Anogramma Link
leptophylla (L.) Link

Pityrogramma Link (45)
argentea (Willd.) Domin
(*Gymnogramma argentea* (Willd.) Mett.)
β **aurea** (Desv.) Domin (*Gymnogramma aurea* Desv.)
[**austroamericana** Domin] (46)
(*Ceropteris calomelanos* (L.) Underw. of Sim)

Adiantum L.
- **caudatum** L. (47)
- **philippense** L. (48) (*A. lunulatum* Burm.)
- **soboliferum** Wall. ex Hook. (49)
- **patens** Willd. var. **Oatesii** (Bak.) Ballard (50) (*A. Oatesii* Bak.)
- **hispidulum** Sw.
- **Capillus-Veneris** L. (*A. Paradiseae* Bak.)
- **aethiopicum** L. (51) (*A. Poiretii* Wikstr. of Sim)
- **Poiretii** Wikstr. (51) (*A. aethiopicum* L. of Sim)
- **sulphureum** Kaulf.
- **Raddianum** Presl (52) (*A. cuneatum* L. & F. non Forst.)

Cheilanthes Sw.
- **capensis** (Thunb.) Sw. (53) (*Adiantopsis capensis* (Thunb.) Fée)
- **depauperata** Bak.
- **hirta** Sw.
- **parviloba** Sw.
- **induta** Kunze
- **multifida** Sw. (54) (*C. Bolusii* Bak.)
- **farinosa** Kaulf.
- **Bergiana** Schlecht. ex Kunze (55) (*Hypolepis Bergiana* (Schlecht.) Hook.)

Notholaena R. Br.
- **Rawsoni** Pappe
- **Buchanani** Bak.
- **Eckloniana** Kunze
- **Marlothii** Hieron. (56)
- **inaequalis** Kunze
- **bipinnata** Sim

Pellaea Link
- **andromedifolia** (Kaulf.) Fée (57)
- **dura** (Willd.) Bak.
- **auriculata** (Thunb.) Fée
- **lancifolia** Bak. (58)
- **Goudotii** (Kunze) C. Chr.
- **quadripinnata** (Forsk.) Prantl
- **namaquensis** Bak.
- **involuta** Bak.
- **viridis** (Forsk.) Prantl (59)
  - β **macrophylla** Sim
  - γ **glauca** Sim

Doniana (J. Sm.) Hook.
calomelanos (Sw.) Link (60) (*P. hastata* (Thunb.) Prantl)
Swynnertoniana Sim
deltoidea (Kunze) Bak. (61) (*Doryopteris deltoidea* (Kunze) Diels)
robusta (Kunze) Hook. (61) (*Doryopteris robusta* Kunze)
pteroides (L.) Prantl

Doryopteris J. Sm.
concolor (Langsd. & Fisch.) Kuhn (62)

Subfam. Vittarioideae

Vittaria J. Sm.
isoetifolia Bory
Volkensii Hieron. (63)
Hildebrandtii Hieron. (64) (*V. scolopendrina* (Bory) Thw. of Sim)

Subfam. Blechnoideae

Blechnum L. (65)
inflexum (Kunze) Kuhn
nudum (Labill.) Mett. ex Luerss. (66)
attenuatum (Sw.) Mett.
tabulare (Thunb.) Kuhn
capense (L.) Schlecht.
punctulatum Sw.
f. **glanduliferum** Schelpe
β **Atherstonei** (Pappe & Rawson) Sim
γ **intermedium** Sim
δ **Krebsii** (Kunze) Sim
australe L.
f. **glanduliferum** Schelpe (*B. auriculatum* Cav. of Sim)

Doodia R. Br.
[**media** R. Br.] (67)

Subfam. Asplenioideae

Asplenium L.
Holstii Hieron. (68)
Kraussii Moore ex Hook.
Trichomanes L.
platyneuron (L.) Oakes
monanthes L.

lunulatum Sw.
erectum Bory (69) (*A. lunulatum* Sw. var. *erectum* (Bory) Sim)
β **lobatum** (Pappe & Rawson)[1] Alston & Schelpe comb. nov.
γ **Zeyheri** (Pappe & Rawson)[2] Alston & Schelpe comb. nov.
inaequaelaterale Hieron. (70) (*A. laetum* Sw. of Sim)
protensum Schrad.
formosum Willd. (71)
obscurum Blume (72)
unilaterale Lam.
varians Wall. ex Hook & Grev.
pumilum Sw. var. **hymenophylloides** Fée nov. (73)
(*A. Eylesii* Sim)
Marlothii Hieron. (73)
anisophyllum Kunze
gemmiferum Schrad.
β **discolor** (Pappe & Rawson) Sim
γ **flexuosum** (Schrad.) Sim
prionitis Kunze
Friesiorum C. Chr. (74)
Christii C. Chr. (75)
Adiantum-nigrum L.
solidum Kunze
splendens Kunze (76) (*A. cuneatum* Lam. of Sim)
aethiopicum (Burm.) Becherer (77) (*A. praemorsum* Sw.)
Buettneri Hieron. (78)
blastophorum Hieron. (79)
abyssinicum Fée
rutaefolium (Berg.) Kunze (80) (*A. bipinnatum* (Forsk) C. Chr.)
Dregeanum Kunze
Sandersoni Hook.
Thunbergii Kunze (81) (*A. auriculatum* Kuhn)
Mannii Hook.

Loxoscaphe Moore
theciferum (HBK) Moore var. **concinna** (Schrad.) C. Chr. (82)
(*Asplenium theciferum* (HBK) Mett. of Sim)
nigrescens (Hook.) Moore (83) (*Asplenium Hollandii* Sim)

Ceterach Lam.
cordatum (Thunb.) Desv.

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(1) Asplenium lobatum Pappe & Rawson Syn. Fil. Afr. Austr. 22 (1858).
(2) A. Zeyheri Pappe & Rawson Syn. Fil. Afr. Austr. 18 (1858).

Diplazium Sw.
zanzibaricum (Bak.) C. Chr. (84)

Athyrium Roth.
scandicinum (Willd.) Presl
schimperi Moug.

Cystopteris Bernh.
fragilis (L.) Bernh.

Subfam. Woodsioideae

Woodsia R. Br.
Burgessiana Gerr.

Subfam. Dryopteridoideae

Dryopteris Adanson
Bergiana (Schlecht.) O. Ktze.
membranifera C. Chr. (85)
impressus (Desv.) Posth. (86)
thelypteris (L.) Gray var. **squamigera** Schlecht. (87)
gongylodes (Schk.) O. Ktze.
dentata (Forsk.) C. Chr. (88) (*D. mollis* (Jacq.) Hieron of Sim; (*D. mauritiana* (Fée) C. Chr. of Sim)
venulosus (Hook.) O. Ktze. (89)
prolifera (Retz.) C. Chr.
silvatica (Pappe & Rawson) C. Chr.
inaequalis (Schlecht.) O. Ktze.
Pentheri (Krass.) C. Chr. (*D. elongata* (Sw.) Sim non O. Ktze.) (91)
kilemensis (Kuhn) C. Chr. (92)
athamantica (Kunze) O. Ktze.
squamiseta (Hook.) O. Ktze. (93) (*D. Buchanani* (Bak.) O. Ktze.)
crenata (Forsk.) O. Ktze.
cirrhosa (Schum.) O. Ktze. (94)
lanuginosa (Willd.) C. Chr.
africana (Desv.) C. Chr.
foliosa C. Chr. (95) (*Polystichum aristatum* of Sim)

Polystichum Roth.
adiantiforme (Forst.) J. Sm.
lucidum (Burm) Becherer (96) (*P. pungens* (Kaulf.) Presl)
ammifolium (Poir.) C. Chr. (97) (*P. aculeatum* of Sim)
luctuosum Moore
Macleaii (Bak.) Diels

Cyrtomium Presl
caryotideum (Wall.) Presl var. **micropteron** (Kunze) C. Chr. (98) (*C. falcatum* (L. fil.) Pr. of Sim)
Didymochlaena Desv.
truncatula (Sw.) J. Sm.
Tectaria Cav.
gemmifera (Fée) Alston (99) (*Aspidium cicutarium* (L.) Sw. of Sim)
Bolbitis Schott.
Heudelotii (Bory) Alston (100) (*Leptochilus Heudelotii* (Bory) C. Chr.)
Lomariopsis Fée
Warneckii Hieron. (101)

Subfam. Polypodioideae

Platycerium Desv.
angolense Welw.
alcicorne (Willem.) Desv. (102) (*P. bifurcatum* (Cav.) C. Chr. of Sim)
Pleopeltis Humb. & Bonpl.
lanceolata (L.) Kaulf. (*Polypodium lanceolatum* L.)
Loxogramme Presl
lanceolatum (Sw.) Presl (*Polypodium loxogramme* Mett.)
Pyrrosia Mirbel (103)
africana (Kunze) Ballard (*Cyclophorus africanus* (Kunze) C. Chr.)
rhodesiana (C. Chr.) Schelpe (*Cyclophorus rhodesianus* C. Chr.)
Schimperiana (Mett.) Alston
lanceolata (L.) Farwell
Polypodium L.
vulgare L.
rigescens Bory (104)
scolopendria Burm. fil. (105) (*P. phymatodes* L.)
Schraderi Mett. (106) (*P. lineare* Thunb. of Sim)
Pappei Mett.
lycopodioides L.
excavatum Bory (107)
polycarpon Cav. (108) (*P. punctatum* (L.) Sw. of Sim)
magellanicum (Desv.) Copeland (109)
Eckloni Kunze (110) (*P. polypodioides* (L.) Hitch. of Sim)
ensiforme Thunb.

Subfam. Elaphoglossoideae

Elaphoglossum Schott
conforme (Sw.) Schott (111)

isabelense Brause (112)
angustatum (Schrad.) Hieron. (113)
(*E. petiolatum* (Sw.) Urban of Sim)
salicifolium (Willd. ex Kaulf.) Alston (114)
hybridum (Bory) Moore
Aubertii (Desv.) Moore
Kuhnii Hieron. (115)
spathulatum (Bory) Moore

AZOLLACEAE

Azolla Lam.
pinnata R. Br.

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1. *Lycopodium nudum* L., Sp. Pl., ed. iii, 2, 1564 (1764) has priority. *Psilotum natalensis* Gandoger, Bull. Soc. Bot. Franc., 66, 306 (1919) does not appear to be distinct, but the species *L. nudum*, as defined at present, is known to be polyploid.

2. Nessel (1939) in Die Barlappgewächse (Jena), monographed the genus *Lycopodium* L. and recognised two genera, *Urostachys* and *Lycopodium*. In addition to the species quoted by Sim (1915), he records *Urostachys Hieronymii* Hert. from Kamaggas, Klein Namaland (*Schulze* 194) and *U. Holstii* (Hieron.) Hert. from Natal (*Wylie s.n.*, 1906). These plants are possibly *Lycopodium gnidioides* L. fil. and *L. dacrydioides* Bak. respectively.

3. *Lycopodium ophioglossoides* Lam. was collected by Schlechter (No. 4758) in the Pietersburg division of the Transvaal where it has been found in recent years. It has also been collected in Southern Rhodesia, Nyumkombe, *Gilliland* 875 (BM, J).

4. Nessel (1939) recognises a number of varieties of *Lycopodium cernuum* L. and *L. clavatum* L. He records the varieties *Heeschii* and *secundum* of *L. cernuum*, and the varieties *trichiatum*, *inflexum* and *natalense* of *L. clavatum* from South Africa.

5. *Lycopodium complanatum* L. has been found in recent years on mountains in the Caledon, George, Humansdorp, Stellenbosch, Swellendam and Uniondale divisions of the Cape Province, e.g. Hottentots Holland, *Esterhuysen* 3558 (BOL, CTM, PRE); Helpmekaar, *Compton* 4597 (BOL, NBG).

6. Ballard (1950), Amer. Fern Journ., 40, 74—83, t. 9, 10, regards the African *L. sarcocaulon* A. Br. & Welw. as a distinct species. It has been found in Southern Rhodesia, Nuza Plateau, *Gilliland* 1262 (BM); Matopo Hills, *Eyles* 51 (BM) and in Natal, Pietermaritzburg Table Mountain, *Huntley s.n.* (BM). Nessel (1949) recognises a number of varieties of *L. carolinianum* and records the varieties *biceps*, *brevipedunculatum*, *meridionale*, *funiculosum*, *sarcocaulon* and *tuberosum* from Southern Africa. Some of these may be habitat forms and the observation of plants under different environmental conditions in culture is necessary.

7. Alston (1939), Journ. Bot., 77, 221—224, pl. 620, has revised the South African species. A number of the specific epithets used by Sim (1915) have been reduced to synonyms. The terminal arista of the leaves is white and opaque in *Selaginella Dregei* and translucent in *S. caffrorum*.

8. Miss Duthie (1929) described three new species of Isoetes in Trans. Roy. Soc. S. Afr., 17, 321—332. *I. capensis* Duthie is recorded from temporary vleis and wet ground on the Cape Peninsula, *I. stellenbossiensis* Duthie from the Cape Peninsula and the Stellenbosch division, and *I. Stephansenii* Duthie from the Stellenbosch division only. (Specimens of these three species are in the following herbaria: BOL, CTM, NH, PRE)

9. Copeland (1947) in his Genera Filicum places *Ophioglossum Bergianum* Schlecht. in the monotypic genus Rhizoglossum Presl.

10. *Ophioglossum sarcophyllum* Desv. appears to be the correct name for the plants previously referred to *O. capense* Sw. His *O. capense* was not maintained by Swartz in his Synopsis Filicum so presumably he reduced it to *O. nudicaule* L. fil. Clausen (1938) in his monograph of the Ophioglossaceae, Mem. Torrey Bot. Club, 19, prefers to regard the name *O. capense* Sw. as a nomen dubium. Clausen is of the opinion that some of the material referred to *O. capense* Sw. is *O. pedunculosum* Desv. which has an enlarged bulbous rootstock and has the principal veins forming large primary areoles in which numerous veinlets form secondary areoles. *O. lusitanicum* has been recorded for South Africa, probably in error or by misidentification.

11. Although the name *Marattia fraxinea* Sm. (sens. lat.) is used here, the range of pinna and pinnule size and shape requires investigation and comparison with material from East and West Africa and the Mascarene Islands.

12. *Lygodium Brycei* Bak. is regarded as a synonym of *L. Kerstenii* Kuhn.

13. *Anemia Simii* Tardieu Blot (1951), Notulae Systematicae, 14, 208, with glabrous or subglabrous fertile pinnae and the fertile pinnae of the frond longer than the sterile part is different from the tropical African *A. Schimperiana* with pubescent fertile pinnae and with the fertile pinnae as long as or shorter than the sterile part of the frond. Both are distinct from the American *A. anthriscifolia* Schrad.

14. *Marsilea ephippiocarpa* Alston in Journ. Bot., 68, 118 (1930) has numerous sporocarps on each stalk in contrast to the other South African species in which the sporocarps are solitary. It is known from Bechuanaland, Ngamiland, Pan south of Kopjies, *Van Son s.n.* (BM, PRE, TRV); Southern Rhodesia, nr. Fort Victoria, *Rendle* 306 (BM); South West Africa, Mt. Omuranda, nr. Matako, *Dinter* 7207 (BM); Transvaal, Zoutpansberg, Kloppersfontein, *Obermeyer* 645 (TRV), Sabie Reserve, *Young s.n.* (BM, J); Natal, Albert Falls, *Comins s.n.* (BM).

15. Roux (1929) in S. Afr. Journ. Sci., 26, 311—317, has investigated the ecological forms of *M. macrocarpa.*

16. *Marsilea Burchellii* (Kunze) A. Br. with small round sporocarps is regarded as distinct from *M. macrocarpa.*

17. *Marsilea biloba* Willd. with spreading hairs on the sporocarps is regarded as distinct. Specimens thought by Dinter to represent a new species probably belong here.

18. *Marsilea nubica* A. Br. with sub-sessile, glabrous sporocarps has been found in South West Africa: Ovamboland, between Ukualonkathi and Tamamosa, *Barnard s.n.* (CTM 27172); Grootfontein "Keibeb", *Schweickerdt* 2180, 2184 (BM).

19. *Marsilea trichocarpa* Bremekamp in Ann. Tvl. Mus., 15, 234 (1933) with spreading hairs on the sporocarps has been recorded from the Transvaal, Pietersburg, Vivo Vlei, *Bremekamp & Schweickerdt* 193 (TRV).

20. No reference to a valid publication of *M. villifolia* Bremek. and Obermeyer has been found. This name was proposed in substitution for *M. villosa* Burch. ex. Bremek. & Oberm. (Ann. Tvl. Mus., 16, 400 (1936)) non Kaulf.

21. The division of the Gleicheniae into Dicranopteris, Sticherus and Gleichenia follows Christensen (1938) in the Manual of Pteridology and Copeland (1947). *Dicranopteris linearis* (Burm.) Underwood in Bull. Torrey bot. Club, 24, 250 (1907).

22. *Sticherus umbraculiferus* (Kunze) Ching in Sunyatsenia, 5, 285 (1940).

23. Fronds of *Gleichenia polypodioides* may or may not be glaucous, a character which seems to be influenced by habitat.

24. The African *Trichomanes melanotrichum* Schlecht. is regarded as distinct from the American *T. pyxidiferum* L.

25. The South African plants of *Trichomanes montanum* Hook. may constitute a recognisable geographical segregate. The name *T. Robinsoni* Bak. in Journ. Linn. Soc. (Bot.), 9, could be applied if this segregate is found to be sufficiently distinct.

26. Probably most of the African material at present referred to *T. rigidum* Sw. should be referred to *T. cupressoides* Desv. but more than one species may be present in South Africa.

27. The African material previously grouped under *H. lineare* Sw. is regarded as distinct and is referred to *H. capillare* Desv.

28. *Hymenophyllum Henkelii* Sim in S. Afr. Journ. Sci., 17, 283 (1923) is a synonym of *H. Kuhnii* C. Chr., Ind. Fil., 363 (1905).

29. *H. uncinatum* Sim is possibly only a form of *H. peltatum* (Poir.) Desv.

30. Copeland (1947), Genera Filicum, sinks *Hemitelia* in *Cyathea*.

31. *Cyathea Holstii* Hieron. in Pflanzenwelt Ostafr., C, 88 (1895) a short-trunked species with bi-pinnate fronds has been collected in Southern Rhodesia, Mt. Selinda forest, *Longfield* 11 (BM).

32. *Cyathea Deckenii* Kuhn in v. Deck. Reis., 3, 3, Bot., 57 (1879) with characteristic spiny stipes and rachises has been collected in the following localities: Southern Rhodesia: Umtali, Vumba Mountains, *Fisher* 1113 (NU); Umtali, *Eyles* 4478 (PRE); Inyanga, *Eyles* 2602 (PRE); Gazaland, Chirinda, *Swynnerton* 817 (BM); Ziani Forest, M'Besa Estate, Gilliland 1750 (BM); Portuguese East Africa: Manica e Sofala, Mavita, Rotanda, *Mendonça* 2651 (BM); Serra de Mavita, *Mendonça* 1472 (BM).

33. Available material is inadequate to show if *Cyathea Thomsoni* Bak., in Journ. Bot., (1881) 180 (Type Loc. Nyasaland) to which Baker referred *Swynnerton* 817 (K) from Chirinda, Southern Rhodesia, and its possible synonyms *C. mossambicensis* Bak. in Ann. Bot., 5, 185 (1891) and *C. zambesiaca* Bak., Ann. Bot., 8, 121 (1894) constitute a good species.

34. The African material is considered distinct from the American specimens of *Nephrolepis cordifolia* (L.) Presl.

35. In Supplement II of the Index Filicum, Christensen (1917) transferred *Dryopteris orientalis* (Gmel.) C. Chr. to *Arthropteris*.

36. *Arthropteris monocarpa* (Cordem.) C. Chr., Dansk Bot. Arkiv, 7, 72 (1932) in which the articulation of the rachis occurs in the lower half of the rachis (instead of the upper half as in *A. orientalis*), has been found in Natal, Krantzkloof, *Schelpe* 3140 (BM) and in Southern Rhodesia: Umtali, nr. Vumba Hotel, *Fisher & Schweickerdt* 207 (BM); Tsaptsa Pass, *Gilliland* 2087 (BM).

37. *Oleandra distenta* Kunze is the oldest name applied to the African species. *O. africana* R. Bon. (1924) is a later synonym.

38. In his revision of the genus *Pteridium*, Tryon in Rhodora, 43, 505 (1941) recognised a number of subspecies and varieties. The Southern African material is cited under ssp. *typicum*.

39. Kümmerle (1915) in his revision of *Lonchitis* (Bot. Közlemenjeck, 14, 166) has distinguished a number of species in the *L. pubescens* group. The two species known to occur in South Africa are *L. natalensis* Hook. and *L. stenochlamys* Fée. The latter has been regarded by some authors as synonymous with *L. glabra* Bory., but it is thought that this name has been misapplied. Plates 131 and 132 in Sim, Ferns of South Africa, ed. ii, (1915) are of *L. natalensis* and *L. stenochlamys* respectively.

40. African *Pteris vittata* L. is distinct from the American *P. longifolia* L.

41. The African *Pteris quadriaurita* Retz. is regarded as distinct from *P. biaurita* L. The name *P. quadriaurita* is applied here in a broad sense and it is possible that the South African material constitutes a good species which could be referred to *P. Abrahami* Hieron. or *P. catoptera* Kunze.

42. *Pteris brevisora* Bak. is antedated by *P. pteridioides* (Hook.) Ballard, Kew. Bull., (1937) 348 (*Hypolepis* Hook.).

43. The name *Actiniopteris australis* (L. fil.) Link is used here in a broad sense. *A. radiata* (L.) Link is possibly distinct.

44. Much confusion exists in the nomenclature of the species of *Ceratopteris*, which is mainly due to the inadequacy of material. Further observations of plants in culture, from juvenile to mature stages, is required. The African plants appear to belong to *C. cornuta* Le Prieur. Ann. sc. nat., 19, 103 (1830).

45. *Pityrogramma* is maintained as a genus by Christensen (1934) in Supplement III to the Index Filicum. *P. aurea* (Willd.) C. Chr. is regarded here as a variety of *P. argentea* (Willd.) Domin following Domin (1929), "The hybrids and garden forms of the genus Pityrogramma (Link)", Rozpr. II Tr. Ceské Akademie, 38, No. 4.

46. *Pityrogramma calomelanos* (L.) Link has become established rapidly as a weed in countries to which it has been introduced. The pattern of spread of *Pityrogramma austroamericana* Domin in Natal from Durban indicates that this species has been introduced. (Domin (1928) Publ. Fac. Sci. Univ. Charles, No. 8, 7 and Kew. Bull. (1929) 22).

47. The name *Adiantum caudatum* L. is used here in a broad sense. Some African material may be segregated under *A. incisum* Forsk.

48. *Adiantum lunulatum* Burm. (1768) is antedated by *A. philippense* L., Sp. Pl., 1094 (1753). See Christensen, Ind. Fil., Suppl. III, 19.

49. *Adiantum soboliferum* Wall. ex Hook., Sp. Fil., 2, 13, t. 74 A (1851) (Syn. *A. Mettenii* Kuhn ex Hook. & Bak.) differs from *A. philippense* L. in that it has the rachis and pinna petioles winged to a width of 0·7 mm. It has been found in Portuguese East Africa, Manica e Sofala: Mosswise, Gogoi, Sitatonga, *Pedro e Pedrogão* 7528 (BM); Mavita, Vale do R. Rotanda, *Pedro e Pedrogão* 6025 (BM).

50. *Adiantum patens* Willd. var. *Oatesii* (Bak.) Ballard in Kew. Bull. (1937) 31.

51. The fact that Sim (1915) confused the identity of *Adiantum aethiopicum* L. and *A. Poiretii* Wikstr. was pointed out by Schelpe in Journ. S. Afr. Bot., 15, 43 (1949).

52. *A. Raddianum* Presl (*A. cuneatum* Langsd. & Fisch. non Forst.) a species common in cultivation may have escaped frequently. It was recorded by Bonaparte in N. Pterid., 10, 135 (1920) from the Transvaal Drakensberg (*Junod* 4049). It has also been found in Southern Rhodesia, Umtali, Black Mountain Inn, *Chase s.n.* (BM, NH); Mrs. Strickland's Farm, Nodzi, Penhalonga, *Gilliland* 802 (BM); and Natal, Qudeni Forest, *Fisher* 885 (BM, NH) and in the environs of Pietermaritzburg.

53. In accordance with the view of Christensen (1934), Ind. Fil., Suppl. III, 18, *Adiantopsis capensis* is transferred to Cheilanthes.

54. It is doubtful whether *Cheilanthus Bolusii* Bak. is distinct from *C. multifida* Sw. *C. Dinteri* Brause in Beitrage zur Flora von Afrika, 45 (1915) is reputed to differ from *C. multifida* in that the ultimate pinnae are not cut to the rachis. It is considered to be synonymous with *C. multifida*.

55. The view of Christensen (1932) in Pteridophyta of Madagascar that *Hypolepis Bergiana* (Schlecht.) Hook. should be placed in the genus Cheilanthes, subgenus Hypolepidopsis, is upheld.

56. *Notholaena Marlothii* Hieron. in Engl. Jahrb., 46, 384 (1911) is regarded as distinct from *N. Eckloniana* Kunze. The costae of the pinnae in *N. Eckloniana* are clothed with lanceolate scales and hairs, whereas those of *N. Marlothii* are covered by white hairs only. *N. Marlothii* is known from South West Africa: Okahandja, *Dinter* 386 (BM); Grootfontein, "Ossa", on limestone, *Schweickerdt* 2125 (BM); Grootfontein, Hoba Hills, *Schweickerdt* 2105 (BM); Hoffnung, *Jordan s.n.* (BM).

57. *Pellaea andromedifolia* (Kaulf.) Fée has been found on a number of occasions since Drège's original collection in South Africa. It is known from the following localities in the Cape Province. Beaufort West: Klipbank, *Pillans s.n.* (BOL, PRE). Laingsburg: n'Gaap Kop, *Compton* 9287, 12619 (NBG), *Esterhuysen* 3248 (BOL); Whitehill Ridge, *Compton* 3116 (BOL); Witteberg foothills, *Compton* 2961 (BOL); Laingsburg, *Marloth* 2532 (PRE); Sutherland: Klein Roggeveld, Schietfontein, *Compton* 8120 (NBG).

58. *Pellaea lancifolia* Bak. is possibly only a deeply cut form of *P. auriculata* (Thunb.) Fée.

59. *The varieties of Pellaea viridis* (Forsk.) Prantl recognised by Sim (1915) are retained but no satisfactory characters have been found to delimit them. *P. leucomelas* Bak. is synonymous with the var. *glauca*.

60. The correct application of the name *Pellaea calomelanos* (Sw.) Link was pointed out by Ballard, Kew. Bull. (1937) 346.

61. Although Tryon (1942) in Contrib. Gray Herb., 143, referred *Doryopteris deltoidea* (Kunze) Diels and *D. robusta* Kunze to Cheilanthes, their soral characters show a greater similarity to those of the genus *Pellaea*.

62. Tryon (1942) in Contrib. Gray Herb., 143, has segregated a var. *Kirkii* (Hook.) Fries which has interrupted cheilanthoid sori. The variability in the continuity of the sori renders the validity of this variety doubtful.

63. *Vittaria Volkensii* Hieron., Engl. Jahrb., 53, 428 (1915) which is easily distinguishable from *V. isoetifolia* in that it has a black stipe, has been collected in Southern Rhodesia and Portuguese East Africa. Southern Rhodesia: Chimanimani Mtns., *Swynnerton* 802 (BM); Vumba, *Wild* 2843 (BM); Umtarazi Forest, *Gilliland* 1966 (BM). Portuguese East Africa: Mavita, *Mendonça* 2645 (BM); Macequece, *Pedro e Pedrogão* 6861 (BM).

64. From Sim's figure (Ferns of South Africa, ed. ii, pl. 186) and his description it appears that his plant was *Vittaria Hildebrandtii* Hieron. (Engl. Jahrb., 53, 419 (1915)) and not the much larger *V. scolopendrina* (Bory) Thw.

65. The African species of Blechnum have been revised by Schelpe in Journ. Linn. Soc., Lond., 53, 487—510 (1952). Glanduliferous forms of both *B. punctulatum* and *B. australe* are described.

66. *Blechnum nudum* (Labill.) Mett. ex Luerss. was discovered in the Langekloof, Jonkershoek, Stellenbosch div., *Schelpe* 1866 (BM, BOL).

67. *Doodia media* R. Br., an Australasian fern, with small sharply serrate pinnae, has been found in the environs of Pietermaritzburg, e.g. *De Villiers* 33 (NU), *Johnstone* 65 (NU). It is thought to be an escape from cultivation.

68. *Asplenium Holstii* Hieron. (Engl. Jahrb., 46, 348 (1911)) with large simple fronds bearing two rows of long, oblique, linear sori has been found in Portuguese East Africa: Garuso, *Fisher & Schweickerdt* 338 (BM), 501 (BM, NU), *Mendonça* 3592 (BM).

69. *Asplenium erectum* Bory is considered to be distinct from *A. lunulatum* Sw. The var. *lobatum* appears to be synonymous with *A. usambarense* Hieron. (*A. lobatum* Pappe & Rawson, Syn. Fil. Afr. Austr. 22 (1858). *A. Zeyheri* Pappe & Rawson, Syn. Fil. Afr. Austr., 18 (1858)).

70. The African material referred to *Asplenium laetum* Sw. is segregated here under *A. inaequaelaterale* Willd., Sp., 5, 322 (1810).

71. *Asplenium formosum* Willd., Sp., 5, 329 (1810) which differs from *A. protensum* in having a shiny black stipe and rachis has been found in Portuguese East Africa: Garuso, *Fisher & Schweickerdt* 497 (NU), 519 (BM, NU).

72. *Asplenium obscurum* Blume, Enum., 181 (1828) which is distinguished from *A. unilaterale* by its larger size, thicker texture and dull green stipe and rachis has been found in Southern Rhodesia: Melsetter Distr., Mt. Selinda, *Longfield* 13 (BM). and in Portuguese East Africa: Garuso, "Jaegersburg", *Fisher & Schweickerdt* 500 (BM); Garuso Forest, *Schweickerdt* 2032 (BM).

73. *Asplenium Eylesii* Sim (Ferns S. Afr., ed. ii, 147 (1915)) has been considered to be synonymous with *A. pumilum* Sw. var. *hymenophylloides* (Fée) but is retained as a species by Christensen. (*A. hymenophylloides* Fée, 7 mem., t. 15, f. 4 (1857)) *A. Marlothii* Hieron., Engl. Jahrb., 46, 357 (1911) is probably synonymous with this.

74. *Asplenium Friesiorum* C. Chr., Notizbl. Bot. Gart. Berlin, 9, 181 (1924) is distinct from the American *A. serra* Langsd. & Fisch.; see Ballard, Ic. Plant., ser. 5, 4, pl. 3366 (1938).

75. *Asplenium Christii* Hieron., in Engl. Pflanzenwelt Ostafr., C, 82 (1895) has been found in Natal, Eshowe, *Forbes* 690 (NH) and in Southern Rhodesia, Chirinda Forest, Mt. Selinda, *Swynnerton* 842, 843, 853 (BM), *Fisher & Schweickerdt* 384 (BM).

76. The South African specimens previously referred to the American *Asplenium cuneatum* Lam. are segregated here under *A. splendens* Kunze.

77. *Asplenium aethiopicum* (Burm.) Becherer antedates *A. praemorsum* Sw.

78. *Asplenium Buettneri* Hieron. in Deutsche Zentralafr. Exp., 2, 23 (1910) differs from *A. aethiopicum* in having less divided and more broadly cuneate segments. It has been found in Portuguese East Africa, Manica e Sofala: Cheringoma, Durundi, *Torre* 4208 (BM); Chimoio, Xiluvo Mtns., *Pedro e Pedrogão* 9145 (BM); Mosswize, Busi R., *Pedro e Pedrogão* 7497 (BM); Vila Machaido, Chiluvo Mtns., *Mendonça* 3939a (BM).

79. *Asplenium blastophorum* Hieron., Engl. Jahrb., 46, 378 (1911) is distinguished from *A. aethiopicum* by having broader proliferate fronds and having strongly winged spores. It has been found in Southern Rhodesia: Chirinda, *Swynnerton* 845 (BM); Mt. Selinda, *Longfield* 1 (BM), *Fisher & Schweickerdt* 383 (BM) and in Portuguese East Africa: Garuso, "Jaegersburg", *Fisher & Schweickerdt* 506, 522 (BM).

80. *Asplenium rutaefolium* (Berg.) Kunze is the correct name since both *A. bipinnatum* (Forsk.) C. Chr. and *A. achilleifolium* (Lam.) C. Chr. are antedated by earlier homonyms. In his Pteridophyta of Madagascar, Christensen (1932) refers this plant to *A. achilleifolium* (Lam.) C. Chr. var. *bipinnatum* (Forsk.) C. Chr. *A. linearilobum* Peter is a possible synonym.

81. *A. Thunbergii* Kunze (1836) antedates *A. auriculatum* (Thunb.) Kuhn (1868).

82. Christensen (1932) and Copeland (1947) are followed in maintaining the genus Loxoscaphe. It is thought that the African material should be segregated from the typical American *L. thecifera* (HBK) Moore under the variety *concinna* (Schrad.) C. Chr.

83. *Asplenium Hollandii* Sim and *A. hypomelas* Kuhn are synonymous with *Loxoscaphe nigrescens* (Hook.) Moore.

84. *Diplazium zanzibaricum* (Bak.) C. Chr. has been collected in Southern Rhodesia, Melsetter, Bridal Veil Falls, *Fisher* 1463 (BM, NU) Umtali, Vumba Mtns., *Fisher* 1323, 1324, 1541, 1558 (BM, NU) and

from the Transvaal, Haenartsburg, *Enslin & Schweickerdt s.n.* (BM, PRU). Portuguese East Africa, Garuso Mountain, *Schweickerdt* 2029 (BM, PRU). The African species of this genus are in need of revision, and it is possible that this species may be conspecific with *D. arborescens* (Bory) Sw. (sens. lat.).

85. *Dryopteris membranifera* C. Chr. in Bonap., N. Pterid., 16, 170, t. 2 (1925) with a frond that is reduced below and with long white hairs on the indusia and with the veins of the pinnae not anastomosing, has been found in Natal, Southern Rhodesia and in Portuguese East Africa, e.g. Natal, Kranzkloof, *Schelpe* 1143 (BM, NU); Southern Rhodesia, Honde Valley, *Gilliland* 1124 (BM).

86. *Dryopteris impressus* (Desv.) Posth., Vorh. K. Akad. Wet. Amst., ser. 2, 36, 5, 14 (1937) has attenuated pinnae up to 33 cm. long on which the veins do not anastomose below the sinuses. Minute yellow glands are crowded along the ventral surface of the veins and the indusia bear yellow glands and very thin white hairs. It has been found in Portuguese East Africa, Manica e Sofala, Cheringoma, Inhaminga, *Mendonça* 4372 (BM).

87. The African material of *Dryopteris Thelypteris* (L.) Gray differs from the European typical material in having scales on the costae and is segregated under the variety *squamigera* Schlecht.

88. *Dryopteris dentata* (Forsk.) C. Chr. has priority over *D. mollis* (Jacq.) Hieron. *D. quadrangularis* (Fée) Alston may be distinct.

89. *Dryopteris venulosus* (Hook.) O. Ktze., Rev., 2, 814 (1827) has a creeping rhizome, fronds which are decrescent below, one or two pairs of veinlets anastomosing below the sinuses, the veinlets being subglabrous. It has been found in Portuguese East Africa, Manica e Sofala: Chimoio, Gondola, *Mendonça* 28 (BM); Manica, serra da Mavita, *Mendonça* 1422 (BM).

90. *Dryopteris Friesii* Brause is considered conspecific with *D. silvatica* (Pappe & Rawson) C. Chr.

91. *Dryopteris Pentheri* (Krass.) C. Chr. appears to be the valid name for *D. elongata* (Sw.) Sim non O. Ktze.

92. *Dryopteris kilemensis* (Kuhn) C. Chr. with adpressed lanceolate scales on the secondary and tertiary rachises has been collected in Southern Rhodesia: Umtali, Pioneer Farm, *Fisher & Schweickerdt* 319 (BM), Vumba, *Fisher & Schweickerdt* 440 (BM) and in Portuguese East Africa, Manica, Chimanimani, *Pedro e Pedrogão* 7371 (BM).

93. *Dryopteris squamiseta* (Hook.) O. Ktze. antedates *D. Buchanani* (Bak.) O. Ktze.

94. *Dryopteris cirrhosa* (Schum.) O. Ktze. which has the stipe and rachis set with numerous brown hair-like scales has been found in Portuguese East Africa, Manica e Sofala: Mossurize, between Espungabera & Gogoi *Pedro e Pedrogao* 7477 (BM), Chimoio, Garuso, *Mendonça* 2533 (BM).

95. *Dryopteris foliosa* C. Chr., Dansk Bot. Arkiv, 9, 3, 61 (1937).

96. *Polystichum lucidum* (Burm.) Becherer in Candollea, 7, 227 (*Asplenium lucidum* Burm., 1768) has precedence over *P. pungens.*

97. Christensen (1932) regards this plant as very near the European and African *P. setiferum* (Forsk.) Woynar and uses the name *P. ammifolium* (Poir.) C. Chr. for it.

98. See Christensen's revision of the genus *Cyrtomium* in Amer. Fern Journ., 20, 41 (1930).

99. *Tectaria gemmifera* (Fée) Alston, Journ. Bot., 77, 228 (1939).

100. *Bolbitis Heudelotii* (Bory) Alston, Journ. Bot., 72, Suppl. 3.

101. *Lomariopsis Warneckii* Hieron. with dimorphic fronds similar superficially to those of *Blechnum capense*, has pinnae which are articulated to the rachis. The margins of the pinnae are finely irregularly crenulate-undulate. It has been collected in Southern Rhodesia: Mt. Selinda, Chirinda Forest, *Chase s.n.* (BM, NU) and in Portuguese East Africa: Garuso, *Schweickerdt* 2031, 2034 (BM).

102. *Platycerium alcicorne* (Willem.) Desv. differs from the Australian *P. bifurcatum* in having apical sterile areas on the fertile ultimate segments of the fertile fronds.

103. The African species of the genus *Pyrrosia* have been revised by Schelpe, Journ. S. Afr. Bot., 18, 123 (1952).

104. A southern form of *Polypodium rigescens* Bory with small (3—6 cm. long, 0·6—0·8 cm. broad), deeply pinnatifid fronds and with prominent paraphyses in the sori, has been found on the Natal Drakensberg: Royal Natal National Park, summit of Tugela Falls (9,700′), *Schelpe* 2000 (BM, BOL, K, NU); Cleft Peak, Cathedral Peak Area, *Box* 3360 (BM) and in Southern Rhodesia: Inyanga, Inyangani (2,400—2,450 m.) *Fries, Norlindh & Weimarck* 3593 (LD), *Norlindh & Weimarck* 4995 (LD).

105. *Polypodium scolopendria* Burm. fil., Fl. Ind., 335 (1768) antedates *P. phymatodes* L. (1771).

106. Christensen (1932) is followed in segregating the African plants previously referred to *P. lineare* Thunb. under *P. Schraderi* Mett.

107. *Polypodium excavatum* Bory differs from *P. Schraderi* in having fronds of a much thinner texture with the veins unobscured. It is known from the Belfast, Pietersburg, Pilgrims Rest and Zoutpansberg districts of the Transvaal and from the Manica and Umtali districts of Southern Rhodesia, e.g. Vumba Mtns., *Obermeyer* 2057 (PRE, TRV), *Fisher* 1119, 1204 (NU); Mt. Nuza, *Gilliland* 372 (BM).

108. *Polypodium polycarpon* Cav. Descr., 246 (1802); Sw., Schrad. Journ., 1800 21 (1801) should be used in place of *P. punctatum* (L.) Sw. (1801) non Thunb. (1784). *P. irioides* Lam. is another synonym. See Christensen (1937) in Dansk. Bot. Arkiv, 9, 3, 12.

109. *Polypodium magellanicum* (Desv.) Copeland with small, simple, oblanceolate entire fronds (1·3—3·0 cm. long, 0·3—0·5 cm. broad) bearing short tumid sori set at 30° to the midrib, has been collected in the Cape Province, Stellenbosch div., Jonkershoek, Victoria Peak, 5200′, *Wicht* 148 (BM).

110. The African *P. Eckloni* Kunze is distinct from the American *P. polypodioides*; see Weatherby, Contrib. Gray Herb., 124, 22 (1939).

111. It appears that Sim (1915) did not confuse the application of the names *Elaphoglossum conforme* (Sw.) Schott and "*E. petiolatum*" as suggested by Adamson, Journ. S. Afr. Bot., 8, 271 (1942).

112. *Elaphoglossum isabelense* Brause in Engl. Jahrb., 53, 432 (1915) which differs from *E. conforme* in having larger, lanceolate fronds with acute-acuminate apices is known from the Transvaal, Graskop, *Schweickerdt* 1630 (BM) and from Southern Rhodesia, Nuza Plateau, *Gilliland* 890 (BM). Further study of the *E. conforme* group should determine the validity of this species.

113. The African *Elaphoglossum angustatum* (Schrad.) Hieron. is regarded as distinct from the Jamaican *E. petiolatum* (Sw.) Urban, on the characters of the rhizome scales and the shape of the fronds.

114. *Elaphoglossum salicifolium* (Willd. ex Kaulf.) Alston in Exell, Cat. Vasc. Pl. S. Tome, 92 (1944) has membranous, linear fronds with the ventral surfaces thinly clothed in small fimbriate scales, especially about the midrib. It is known from Southern Rhodesia, Vumba Mtns., Norseland, *Chase* 3472 (BM).

115. *Elaphoglossum Kuhnii* Hieron., Engl. Jahrb., 46, 399 (1911) has the ventral surface of the fronds densely clothed with fimbriate

scales. A series of specimens tentatively referred to this species have been collected in Southern Rhodesia: Odzani Falls, Umtali, *Chase* 3169 (BM); Odzani River Bridge, Umtali, *Chase* 3235 (BM); Vumba Mtns., Norseland, *Chase* 3473 (BM).

HERBARIUM ABBREVIATIONS

BM	British Museum (Nat. Hist.), London.
BOL	Bolus Herbarium, Cape Town.
CTM	South African Museum, Cape Town.
J	Witwatersrand University, Johannesburg.
K	Herbarium, Royal Botanic Gardens, Kew.
LD	Botaniska Museet, Lund.
NBG	National Botanic Gardens, Kirstenbosch.
NH	Natal Herbarium, Durban.
NU	University of Natal, Pietermaritzburg.
PRE	National Herbarium, Pretoria.
PRU	University of Pretoria, Pretoria.
TRV	Transvaal Museum, Pretoria.

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TESTUDINARIA AS A SECTION OF THE GENUS DIOSCOREA

By I. H. Burkill.

Testudinaria does not deserve generic rank but is a section of the large genus *Dioscorea*. Too many species have been described and I reduce them to three whereof the second in the following enumeration may seem to some a subspecies of the first rather than a species specifically distinct. The three are: (i) *Dioscorea* (*Testudinaria*) *elephantipes* to which Burchell's *T. montana* must be reduced; (ii) *D. hemicrypta* which is described below, and (iii) *D. sylvatica* within which all the following fall, *D. rehmanni*, *D. brevipes*, Knuth's *D. montana*, *T. paniculata* and Marloth's *T. multiflora*. The first and second have a rather restricted distribution within the Cape Province; the third is spread from the area of the others to Northern Rhodesia. Their several distributions are indicated in fig. 1 where the numbers 1, 2 and 3 are placed on the administrative divisions where they occur. *D. hemicrypta* is Marloth's *Testudinaria glauca* which takes a new specific name on transfer to Dioscorea because 'glauca' is a preoccupied adjective under Dioscorea.

Fig. 1. The distribution of the three species of the section *Testudinaria*: 1. *Dioscorea elephantipes*; 2. *D. hemicrypta* and 3. *D. sylvatica*.

The first of the three had been in Botanic Gardens for 50 years under the generic name *Tamus* or *Tamnus* before the discovery of its fruits showed the error of that name, and *Testudinaria* was suggested in substitution. The Dutch had been at the Cape for 150 years before it came to the notice of botanists, for its home was well beyond their early colonizing.

In 1771 Carl Pehr Thunberg, Linnaeus' most famous pupil, travelling on a grant from the university of Uppsala, arrived in Amsterdam and called on the two Burmans, Jan and his son Nikolaus Lorenz. The father, much impressed by Thunberg's knowledge, suggested a visit to the Dutch settlements in the East and forwarded it by procuring for him an appointment as surgeon by which he reached Table Bay on 16 April, 1772. It was in the next year that he met with *D. elephantipes.*

The chief function of Cape Town from its beginning had been the revictualling of ships; and instructions given to van Riebeeck in 1652 to grow vegetables for the purpose were still so adhered to that there was a state garden (much frequented as a promenade) under a horticulturist, Johan Andreas Auge who, besides his vegetables, embellished the promenade with some ornamental plants. The governor, Tulbagh, who died just before Thunberg's arrival, had encouraged Auge to travel and to collect plants; and Auge had been able to add a little to his pay by selling small herbaria to passengers bound for Europe. He was prepared to travel again and became Thunberg's guide, taking him in 1772 to Saldanha Bay and by the Berg and Breede valleys to Swellendam. While they were away Francis Masson who had been sent out to collect living plants for the Royal Gardens, Kew, arrived at Cape Town and getting the services of a soldier, Franz Pehr Oldenburg, to guide him, made much the same journey as Thunberg was making. Neither of them in that season approached the home of the Dioscorea; but in the next summer they went together under Auge's guidance by Swellendam and eastwards to a point two days' journey beyond the Sundays River. It was somewhere in mountains near their limit that they met with the plant in new leaf, the date of their turning back being 17 December, 1773. Rain had not come to usher in a period of flowering and they were disappointed. It seems curious that there is no mention of the plant in Thunberg's 'Travels' (english edition of 1794-5) nor in Masson's paper in the Philosophical Transactions of the Royal Society (66, pp. 268-317; 1776). There are two specimens in Thunberg's herbarium; one is labelled 'Dioscorea, fuerois Tamnus capensis Th(unbergii). Caulis e bulbo tesselato' and the other 'Tamnus cap(ensis) Th(unbergii). Bulbus tesselatus magnus vivax'; and from the different wording it would seem that Thunberg had fallen in with it twice between which he had made up his

mind on the name that he was to give it. Masson would seek small specimens for his purpose and Lindley indicates that he sent more than one to Kew (Lindley in Bot. Reg. 921). Aiton's year for their receipt is 1774 (Hort. Kew. 3, p. 400). Linnaeus' correspondence holds a letter from Thunberg dated 4 April, 1774, in which Thunberg states that he was sending a colleetion of living plants to Aiton with a request that he would turn them over to the Swedish Legation for redirecting to Linnaeus. It would be natural for Thunberg and Masson to use the same opportunity for their despateh. Thunberg and Masson made another journey together, but nothing conneets our plant with it; then they parted, Thunberg for the East and Masson for Britain, and we hear of him as writing to Linnaeus from the address of the horticultural firm of James Lee of Hammersmith. Auge, left at the Cape, probably took the plant into his garden and possibly it was from his garden that David Nelson in 1776 obtained a leafy specimen now at Kew. Outside the Cape it would seem that there were no plants elsewhere than Kew.

In 1788 Charles Louis L'Héritier de Brutelle came to London for materials for his 'Sertum anglicum' and with Aiton agreed to call the plant *Tamus elephantipes*, accepting it and advertising it to appear as plate 40 of his second part. But part 2 never appeared. Aiton used the name on p. 104 of the third volume of his 'Hortus Kewensis' (1789). Ten or more years later James Niven sent further tubers to Europe. Niven had gone to the Cape in 1798 to collect living plants, etc., for the garden of George Hibbert at Clapham and that of the Empress Josephine in Paris; and he remained there until 1812 collecting, then, for the firm of James Lee. Hibbert's plants passed about 1809 into the possession of the horticulturist Joseph Knight who flowered a female plant from a tuber one foot across in or just before 1811; and Sims obtained from it plate 1347 of the 'Botanic Magazine' with a description by Gawler. The female flowers did not determine the genus which remained Tamus. It is not reeorded that Niven sent the plant to his other patrons; but the Cambridge Botanic Garden acquired a plant before the issue of the Curator's catalogue of 1807. The Cambridge plant when it flowered proved to be male.

William John Burchell, schoolmaster and Government Botanist in St. Helena, decided to explore at the Cape and moved in 1810 to Cape Town and in 1812 from Cape Town to the eastern scarcely-settled borderland near Port Elizabeth. In 1814 in the Graaf Reinet Division he found *D. elephantipes* with ripe capsules; but not until he was preparing the manuscript of his 'Travels' for the Press does he seem to have been troubled by the need of a name for it; then, in 1820, he consulted Richard Antony Salisbury. Salisbury had already made up his mind that the genus

Dioscorea as it existed should be broken up into several small genera, and he put our plant into none of them, but replied to Burchell by supplying a paragraph from a lengthy paper that he was preparing wherein he proposed *Testudinaria* as a genus apart; and this paragraph Burchell published in his 'Travels' (2, p. 147). The identical words may be found in Salisbury's 'Genera of plants' issued by J. E. Gray in 1866 (p. 14), those of the definition being 'styles united; stigmata short and obtuse; seed winged only at the top, and . . . longer floral envelope' than in *Dioscorea polygonoides* to which West Indian species Salisbury had almost whittled down the genus *Dioscorea*. He did not stress habit, nor the size and armour of the tuber. Salisbury did not live to finish his paper. Neither he nor Burchell put into print the combination *Testudinaria elephantipes* which later authors have variously assigned: it should be attributed to Lindley who accepted the genus at once (1825). But Sprengel (1827) did not accept it; he called the plant *Dioscorea elephantopus*. Nor did Ecklon accept it (1830), nor Endlicher (1836). However Kunth did so in 1850, and Bentham in 1883 but with reservations which he recorded in his and Hooker's 'Genera Plantarum' (3, p. 744). The weight of the tuber was in the scale.

Before the publication of Burchell's 'Travels', some enterprising person at the Cape began to send tubers to Holland for cultivation by such as would have them. Both the Burmans were dead, but a son of N. L. Burman, of the same baptismal names, wrote to Thunberg offering to send to Uppsala a very fine specimen (see M. C. Karsten in Journ. S. Afr. Bot., 5 pp. 11-16; 1939) saying that from being very rare it had become rather frequent among amateurs in the two years before 1822. The occurrence is interesting as suggesting that Linnaeus did not receive the plant when Aiton did.

Burchell thought that a glaucous form of *D. elephantipes* deserved specific rank and called it *Testudinaria montana*. He brought it into his garden at Fulham and when it flowered (male) dried a specimen for his herbarium which is preserved at Kew. Lindley procured for the 'Botanical Register' (11, pl. 921: 1825) a figure from Burchell's garden. In the text it is described as *Testudinaria elephantipes*; and a reference is made to *T. montana* as if distinct; but I believe that Lindley's figure came from Burchell's garden plant of *T. montana*, but as *T. montana* is *T. elephantipes*, the figure is not under a wrong name. Botanists who have opportunities of examining the plant in a wild state should seek to make sure if there is adequate reason for retaining as a variety the name 'montana'. Burchell was the first botanist to collect *D. sylvatica*, but passed it for *D. elephantipes*. James Bowie who collected plants and seeds at the Cape from 1817 to 1822 left almost contemporary specimens,

one ticketed as from George, the other as from under the Uitenhage mountains. It grows nearer the sea than *D. elephantipes* as Bowie's labels suggest.

Just before Burchell's 'Travels' was published, Christian Frederick Ecklon, a pharmaceutical chemist, arrived in Port Elizabeth and commenced to collect plants. It was he who, recognizing *D. sylvatica*, gave it this name. He described it in a rare journal that escaped notice; but the name was on the labels of specimens that he sent out, and they led to Kunth's issue of *Testudinaria sylvatica* in 1850. As the reader will appreciate, all knowledge of this species originated in the extreme southern parts of its distribution; and, as by no means uncommonly happens, it got new names when it became known from remote places. Of them for instance, the first synonym, *D. rehmanni*, was given to a plant from the Transvaal when there was as yet no bridging record of *D. sylvatica* in Natal.

It is a character of the section *Testudinaria* that its species have great drought resistance. It seems to me that another of their characters is deficient resistance to damping off. By my experience with seedlings I believe that the species cannot get a footing away from adequately dry places because the seedlings cannot establish themselves; but direct observations would have a value. The section extends into drier country than other Dioscoreas of southern Africa; the dotted line in figure 1 shows by how much. They are found in particular on and near the crests of ridges which force upwards the winds off the sea; and these winds in rising are compelled to surrender the moisture that they carry. The rain is uncertain and its uncertainty gives the seedlings the way of escaping destruction by damping off. When established their longevity aids them. The armour of a large individual is preserved in the Botanical Museum at Cambridge with the date 1849. I suggest that it is the armour of the plant that Donn obtained for the Garden about 1805. In the year 1849 the site of the Cambridge garden was moved; perhaps the plant could not be retained on that account. There is the armour of another individual in the Museums at Kew with the date 1847. If Donn's plant lived from 1807 to 1849, the Kew plant could have been from the first consignment. Old tubers in their native home become covered by a thicket of their own shoots in consequence of getting a multiplicity of heads (see the figure on p. 253 of the Botany of the Valdivia Expedition); Marloth who wrote the account, says so thickly as to hide the tuber; but the life of the shoots is annual. Trimming in cultivation makes the cultivated plant look different and keeps the heads few. If the life of a plant of *D. elephantipes* may be 50 or more years, that of *D. sylvatica* while perhaps less at any rate exceeds 30 (see Dummer in Kew Bull.,

1912, p. 195). Sir William Hooker in a 'Guide to the Glasgow Botanic Garden' (p. 33; 1849) mentions a plant of *D. elephantipes* at the Cape with a tuber weighing 700 lbs. and a height of 7 feet. It would seem from records that the usual size both in height and diameter is 3 feet; but more ample records of performance would be welcome and probably not difficult to obtain. Burchell's description of the tuber was 'entirely above ground and growing to an enormous size, frequently three feet in height and diameter . . . the inside is a firm fleshy substance which may be compared to a turnip, both in consistence and colour'. Then he adds that the Hottentots ate it cut in pieces and baked. He called it Hottentots' bread; but that name really belongs to the Cycad, *Encephalartos caffer* which the colonists at the Cape had long known. Thunberg, Sparrman, Ecklon and other early writers apply the name to the Cycad Ecklon and later Bunbury (Journ. Res. Cape, p. 113; 1848) mention the use of the Dioscorea. Von Mohl described the cell-structure of the tuber at the age of three years (Vermischte Schriften, p. 186; 1845) and Miss Sparshott the cell-structure of younger tubers (Journ. Linn. Soc. Lond. Bot. 49, p. 593; 1935). It is probable that saponin is present, but not demonstrated. *D. sylvatica* holds it.

All Dioscoreas are tropophytes, storing food in one season for use in the next and storing with the food a certain amount of water on which growth in the next year may be commenced before rain comes. But leafing is unusual until rain comes. Putting together Thunberg's gathering of new leaf and his statement that rain had not come, premature leafing in *Dioscorea elephantipes* is suggested; as it is commonly held that it does not leaf until rain has come. Its flowering is often much delayed. In the more uniform conditions of a conservatory in Britain it flowers in July or August, after the long days of summer, i.e. later than the northern temperate Dioscoreas which are in gardens in England.

The Dioscoreaceae have evolved under unremitting pressure from herbivores; to conserve their store of food from season to season most of them bury it under a sufficiency of earth; those that do not have alternative protection, it may be by an intense poisonousness and in a limited number of species, including Testudinarias, it is by armour. Armour has not been adopted in Asia as it has been in Africa and America; it is met with in a few African species of the section Enantiophyllum as well as in Testudinaria; and it is met with in America in the sections. Pachystigma, Lychnostemon, Polyneuron and possibly others. The possession of armour is, therefore, not a character by which *Testudinaria* can be set up as a genus apart from *Dioscorea*. Twining comes on when the stems of Dioscoreaceae have attained a sufficient length; dwarfing can preclude it and the small amount of twining that the branches do in

D. elephantipes and *D. hemicrypta* is a response to an early arrest of their growth which is associated with low and abundant branching. This habit is no ground for generic diagnosis. The twining in *Testudinaria* is to the left, which is the direction in more than half of the Dioscoreaceae and fully half of the species of *Dioscorea*. The anatomy of the stem can be matched in a large number of species of *Dioscorea*. A glandular forerunner tip is produced in leaf-development as in *Dioscorea*. It was said to lack glands; but that is incorrect (see for instance Hubert Winckler in Ber. deutsch bot. Gesellsch. 43 p. 590; 1925, and Orr in Notes Bot. Gard. Edinb. 15, p. 136; 1926). The flowers are in cymes along a racemose axis which is a common character in *Dioscorea*. It happens that the cymes in *Testudinaria* are never more than 2-flowered and usually the second is arrested; but that behaviour is readily found in American species of *Dioscorea*. The pedicel is rigid and the flower opens wide with the uncovered stamens or stigmas exposed to rain; and the pollination methods are without complications. This too is readily found in American Dioscoreas that were unknown to Salisbury when he used the character of extruded stigmas for generic diagnosis.

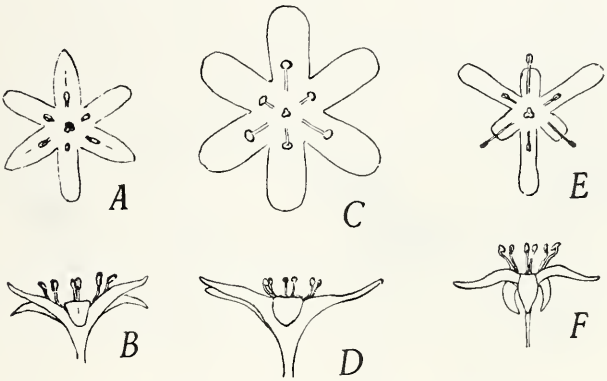

Fig. 2. Flowers from life of the three species of Testudinaria × 5: A and B, of *D. sylvatica*; C and D, of *D. hemicrypta* and E and F, of *D. elephantipes*. That of *D. sylvatica* was produced by a tuber sent by Dr. E. P. Phillips from Pretoria; that of *D. hemicrypta* from a plant raised from seed collected by Prof. E. L. Watkin at the Cango Caves in the Oudtshoorn Division.

Salisbury based his chief claim on the direction of the wing on the seed. It certainly distinguishes the Testudinarias from the majority of the genus *Dioscorea* (including all the rest in Africa), but not from the whole of the genus. Dioscoreas in preparation for the addition of the wing enlarge the loculus and into the space provided the wing is extended

just before seed-ripening. Enlargement is connected with lengthening of the placenta; if the placentas lengthen chiefly below the ovules, the wing has room basally; if evenly, in both directions; if above the ovules, apically. Apical wings are found on the seeds of the genus *Stenomeris*, on those of *Dioscorea* section *Paramecocarpa* which is the section most suggestive of Stenomeris, on the seeds of *Dioscorea* section *Stenophora* more or less, and on the seeds of *Dioscorea* section *Shannicorea*. The section *Stenophora* has a wide broken dispersal in the northern subtropics and warm temperate regions (see fig. 3) with its greatest development in China and Indo-China. *Shannicorea*, *Paramecocarpa* and *Stenomeris* occur within and to the south of the Chinese area of *Stenophora*; and it is apparent that a stronghold of 'seeds winged apically' is in south-eastern Asia, towards which the presence of the same feature in *Testudinaria* directs attention. Uline, intrigued by the similarity of the seed of *Testudinaria* to that of some Stenophoras set up a 'subgenus Testudinaria' to hold the two; but it is completely untenable for the reason that the two components are remote from each other in underground parts. Dr. R. Knuth quite rightly dissociated them.

Fig. 3. Distribution of the sections *Stenophora* and *Testudinaria*.

There are two ways in which the seeds of the Dioscoreaceae are set free; either they glide out of the opening capsule or they are jerked out of a capsule which has dehisced apically and holds them free in a kind of cup. Seeds winged basally then have the nucleus at the mouth of the cup and liberation is like throwing the hammer; but seeds winged

apically are at a disadvantage and not freed neatly. Surely there have been two lines of adaptation to needs and *Testudinaria* has come of the least effective as well as these sections mentioned. In this line *Testudinaria* perhaps suggests an eastern origin; but by the armour one looks for westward alliances for it. In any case the section must be admitted as distinct. If it be right, and it seems to be right, that *Stenomeris*, as being hermaphrodite and many-seeded, exposes the ancestry of the Dioscoreaceae, then the rhizome of *Stenophora*, found also in *Stenomeris*, is an ancestral condition lost to *Testudinaria*, and the apically-winged seeds common to the two and *Testudinaria* an ancestral condition retained. Both characters being absent from the several sections of *Dioscorea* of Africa other than *Testudinaria*, this section seems to represent a layer spread over the old world earlier than the others. Armour came first to the Testudinarias and long afterwards began to appear in the species of *Enantiophyllum*. It is unfortunate that we know at present too little of the armoured American species to bring them into the picture.

DIOSCOREA section TESTUDINARIA.

TESTUDINARIA, Salisbury as a genus, ex Burchell, Travels inter. S. Afr. 2 (1824) 147; Uline as a subgenus in Engl. Bot. Jahrb. 25 (1898) 157 erroneously including the north temperate section Stenophora; R. Knuth in Engl. Pflanzenreich, Dioscoreaceae, (1924) 50 excluding the section Stenophora. *Tuber* at or above the surface of the soil, perennial, with a thick corky armour and a cambium-like growth-zone. *Stems* annual, stout from the very base, twining to the left. *Hairs*, apart from colleters, absent. *Leaves* entire, if large auricled; forerunner tip small but glandular. *Flowers* rigidly pedicellate in both sexes, on a raceme of cymes which are as abundantly 1-flowered as 2-flowered, opening flat with the anthers or the stigmas extruded. *Seeds* winged unevenly all round, little towards the base of the loculus, considerably towards the apex.

KEY TO THE SPECIES.

1. *Tuber* appressed against the soil and held by roots to it, sometimes nearly globose, but usually rather pyramidal above. *Stems* branching low and rarely ascending to more than a man's height. *Leaves* glaucous or scarcely so, broader than the midrib is long. *Flowers* to 4 mm. in diameter .. .. *elephantipes*

2. *Tuber* pyramidal above ground and lobed in the soil (see fig. 4A). *Stems* as those of *D. elephantipes*. *Leaves* glaucous, longer than broad and apparently not producing large auricles. *Flowers* to 6 mm. in diameter .. .. *hemicrypta*

3. *Tuber* plate-like, up to 60 cm. across, but more usually about 30 cm. across. *Stem* climbing to 6 m. and branching distally. *Leaves* in general much more auricled than the above two species, broader than the midrib is long. *Flowers* 5—7 mm. across .. *sylvatica*

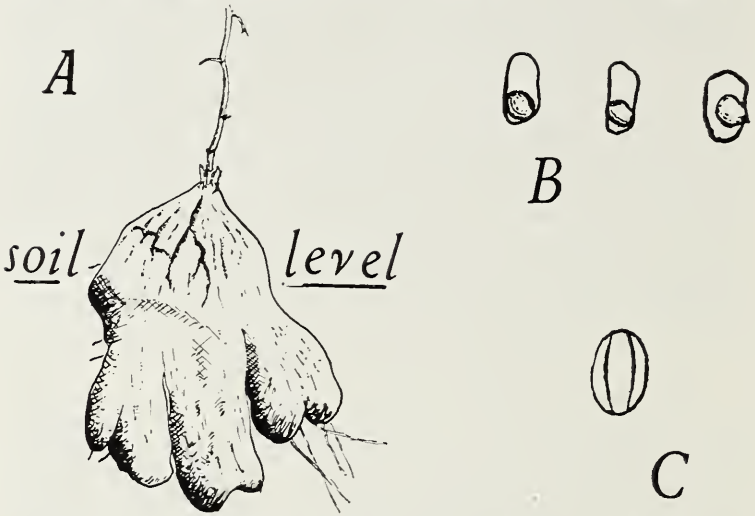

FIG. 4. A, the tuber of *D. hemicrypta* from a photograph by Marloth (origin Oudtshoorn, Taylor, 12738), showing the lobes that are below soil-level. B, seeds, indicating the wing directed upwards. C, a pollen grain, as dry; when wetted it becomes globose.

1. **D. elephantipes** (L'Héritier) Engler in Engl. & Drude, Vegetat. d. Erde, 9 part 2, (1908) 267, and Engl. Pflanzenwelt Afr. 2 (1908) 362 and 1 part 1 (1910) 469; Stoneman, Pl. and their ways in S. Afr. (1915) 377. *D. elephantopus* Sprengel, Syst. 4, Curae post. (1827) 143; Ecklon in S. Afr. Quart. Journ. 1, (1830) 359; R. Knuth in Engl. Pflanzenreich, Dioscoreaceae (1924) 321, excluding the reference to the plant in Natal; Fourcade in Mem. 20 Bot. Surv. S. Afr. (1941) 86. *Dioscorea sp.* Drège, Zwei pflanzengeogr. Dokumente (1843) 60, 135. *Tamus elephantipes* L'Héritier, Sert. Angl. (1788) 29, name only; Aiton, Hort. Kew. (1789) 401; Willdenow, Sp. Pl. 4 part 2 (1805) 772; Donn, Hort. Cantab. ed. 4 (1807) 216; Ker-Gawler in Bot. Mag. (1811) pl. 1347; Aiton, Hort. Kew, ed. 2, 5 (1813) 386 and Epitome Hort. Kew. (1814) 309; Dean, Hort. Croomensis (1824) 137; Fée, Cat. pl. Strasbourg (1836) 10: Desfontaines, Cat. pl. Paris (1839) 34. *Testudinaria elephantipes* Lindley in Bot. Reg. (1825) pl. 921; Donn. Hort. Cantab. ed. 11 (1826)

378, posthumously edited by Pursh and Lindley; W. Masters, Hort. Durovern. (1831) 93, with the issue of this catalogue the imported seeds were put on sale; Salm-Dyck, Hort. Dyckensis (1834) 273; Bojer, Hort. Maurit. (1837) 352; Krauss, Beitr. Fl. Cap u. Natal-landes (1846) 163; Kunth, Enum. pl. 5 (1850) 252; Melliss, St. Helena (1875) 338; Baker in Dyer, Fl. Cap. 6 (1896) 252; Medley Wood, Handb. Fl. Natal (1907) 133; Schönland in Rec. Albany Mus. 2 (1907) 63; Medley Wood in Trans S. Afr. Phil. Soc. 18 (1908) 238; Marloth in Chun, Wissensch. Ergebn. Exped. Valdivia, 2 part 3 (1908) 253, 317; Marloth, Dict. Common names (1917) 140; Juel, Pl. Thunbergianae (1918) 86; Schönland in Mem. 1 Bot. Surv. S. Afr. (1919) 42; Bews, Fl. Natal and Zululand (1921) 67; R. A. Dyer in Mem. 17 Bot. Surv. S. Afr. (1937) 88; Sparshott in Journ. Linn. Soc. Lond. Bot. 49 (1935) 93; Hutchinson, Botanist in S. Afr. (1946) 240. *Testudinaria montana* Burchell, Travels inter. S. Afr. 2 (1824) 148; Lindley in Bot. Reg. (1825) sub. t. 921; Durand and Schinz, Consp. Fl. Afr. 5 (1893) 276 in part.

Distribution, by administrative divisions. Cape Province (on rain from the Atlantic) Clanwilliam Division, between the town of Clanwilliam and Boschkloof between 1000 and 2000 ft., *Meyer*; Aasvogelberg on grassy slopes at 2000 ft., *Meyer*; Clanwilliam, *Marloth* 27151. (On rain from the Mozambique current) Ladismith; Oudtshoorn; Uniondale; Willowmore; Humansdorp; Uitenhage, wherein is apparently the locus classicus; Somerset East; Bedford; Cradock; Aberdeen; Graaf Reinet, where it is common in some parts between 3000 and 4000 ft.; Alexandria and Albany.

2. **D. hemicrypta** Burkill, nomen tantum in Journ. Linn. Soc. Lond. Bot. 53 (1949) 377. *Testudinaria glauca* Marloth in herb. propr. Species in D. elephantipede adhuc immersa, sed differt tubere semisepulto, lobis sepultis vix subere occlusis.

Tuber (accurate cormus) semisepultus inter saxa et in solo sterile cacuminum clivarumque in quibus crescit, parte superiori pyramidalis, armatus tegmine testudinaceo minus quam in D. elephantipede rimoso, parte inferiori lobatus nec armatus. *Caulis* ramosissimus ut in D. elephantipede. *Folia* glaberrima, glauca, longiora quam lata, usque ad 30×20—25 mm., apice apiculata, margine aliquomodo indurata, pleraque 5-nervia; petiolus 10 mm. longus aut brevior. *Inflorescentiae* masculinae ex axillis foliorum distantium porrectae, singulae: axis basi sterilis. *Flores masculini* in anthesi patefacti, itidem porrecti, in quaque inflorescentia nec plures quam 20, plerique binati; pedicelli angustissime alati. *Perianthii* tubus 1 mm. concavus. *Sepala* duplo longiora quam lata, 2—2.5×1 mm., apice exacte rotundata. *Petala* similia, minutissime breviora. *Stamina* oblique extrusa; filamenta 0.5—0.8 mm. longa;

antherae parvae, introrsae. *Racemi feminei* pauciflori; flores pedicellati, pedicellis 2—3 mm. longis. *Ovarium* ad 5 mm. longum. *Perianthii* tubus 1 mm. concavus; lobi lobis floris masculini aequilongi sed angustiores. *Stylus* extrusus, coronatus stigmatibus dispansis nec reflexis. *Capsula* et *semina*, ut videtur, eis D. elephantipedis similes.

Cape Province. Divisio Van-Rhynsdorp, in montibus Langebergen, *Marloth* ! Divisio Ladismith, prope urbem Ladismith ad 800 m. alt., *Marloth* 3990 ! Divisio Prince Albert, *Marloth* 12731 ! Divisio Oudtshoorn, in convalle Cango ad 650 m. alt., *W. Taylor* in Herb. Marloth 12738! atque apud speluncas, *Watkin* ! Vidi etiam exempla viva in vivariis, (Kew et Southampton).

I had long watched young plants of this growing without feeling sure how to separate them from *D. elephantipes* when Marloth's photograph (see fig. 4A) came into my hand. Then I saw its most significant difference. Meanwhile Miss Sparshott's manuscript had been through my hands and I had not ventured to state that a part of her material is this; but her results are not likely to be disturbed by the circumstance. One of the Oudtshoorn specimens and the Van-Rhynsdorp specimens are described as growing on shale; another of the Oudtshoorn specimens is described as growing on limestone; the Prince Albert specimen is described as growing over a quartzite rock. The plant in Marloth's garden flowered in August and September.

3. **Dioscorea sylvatica** Ecklon in S. Afr. Quart. Journ. 1 (1830) 363; Drège in Linnaea 20 (1847) 234; Medley Wood in Journ. Bot. 46 (1906) 200; Engler, Pflanzenwelt Afr. 2 (1908) 364, spelt silvatica; Marloth in Chun, Wissensch. Ergebn. Exped. Valdivia 2, part 3 (1908) 315; Eyles in Trans. R. Soc. S. Afr. 5 (1916) 330; Bews, Fl. Natal and Zululand (1921) 67; J. M. Watt & Breyer-Brandwijck, Med. and Poison. Pl. S. Afr. (1932) 30; O. West in Mem. 23 Bot. Surv. S. Afr. (1951) 130. *D. hederifolia* Griseb. in Mart. Fl. Bras. 3 part 1 (1842) 42, based on Drège 4499 b, teste Kunth, Enum. Pl. 5, 444. *D. rehmanni* Baker in Dyer, Fl. Cap. 6 (1896) 248; R. Knuth in Engl. Pflanzenreich, Dioscoreaceae (1924) 323, as rehmannii. *D. paniculata* Dümmer in Kew Bull. (1912) 195. *D. brevipes* Burtt-Davy in Kew Bull. (1924) 232; R. Knuth in op. cit. 355. *D. marlothii* R. Knuth in op. cit. 321, as a name substituted for Testudinaria multiflora Marloth. *Dioscorea sp.* 4499 Drège, Zwei pflanzengeogr. Dokumente 2 (1843) 147. *D. elephantipes* (non Lindl. sub Testudinaria) Medley Wood, Handb. Fl. Natal (1907) 133 and in Trans. S. Afr. Phil. Soc. 18 (1908) 238, by misidentification of his no. 4386; Bews, loc. cit., following Medley Wood. *D. elephantopus* (non Sprengel) R. Knuth in op. cit., by following Medley Wood. *D. montana* (non Burchell sub Testudinaria) Durand and Schinz, Consp. Fl. Afr. 5

(1893) 276 in part; R. Knuth in op. cit. 323. *Testudinaria sylvatica* Hort. Berol. ex Kunth, Enum. Pl. 5 (1850) 443; Baker in Dyer, Fl. Cap. 6 (1896) 253; Zahlbruckner in Ann. k. k. naturhist. Mus. 15, suppl. (1900) 28; Medley Wood, Handb. Fl. Natal (1907) 133 and in Trans. S. Afr. Phil. Soc. 18 (1908) 238; Phillips in Ann. S. Afr. Mus. 16 (1917) 291; Schönland in Mem. 1 Bot. Surv. S. Afr. (1919) 42; Bews, Fl. Natal and Zululand (1921) 67; Galpin in Mem. 12, Bot. Surv. S. Afr. (1929) 64: Markötter in Ann. Univ. Stellenbosch, 8, no. 1 (1930) 16; Phillips in Journ. R. Hort. Soc. 61 (1936) 336; *T. sylvestris* Hort. Berol. ex Kunth loc. cit. (not to be confused with D. sylvestris Vell. nor with D. sylvestris De Wild.). *T. multiflora* Marloth in Trans. R. Soc. S. Afr. 3 (1913) 127 and 4 (1915) 131.

The synonymy is swollen by giving importance to characters which do not deserve more than varietal rank.

KEY TO THE VARIETIES OF D. SYLVATICA.

Leaves firm, the basal sinus wide because the auricles project outwards.
- Lamina attaining 20 × 40 mm. (see fig. 5 D). Capsules relatively small, measuring 15 mm. along the placenta, or thereabouts *sylvatica* (type)
- Lamina large attaining 60 × 80 mm. (see fig. 5 E). Capsules relatively large, measuring up to 20 mm. along the placenta.
  - Pedicels to 4 mm. long .. .. var. *paniculata*
  - Pedicels about 2 mm. long and the sepals often reflexed var. *brevipes*

Leaves thinner and with a narrow sinus (see figs. 5 B and C).
- Capsules 20—25 mm. long .. .. var. *rehmanni*
- Capsules only 12—14 mm. long .. .. .. var. *multiflora*

The figures 5 A and D show the form of the lamina usual in the Cape Province and familiar to earlier botanists. Then Baker was confronted with the leaf C. and made *D. rehmanni*. Northern plants in a large measure so differ; but Baker while describing Rehmann's plant as a *Dioscorea* still retained *D. elephantipes* as a *Testudinaria*. Dümmer's description of *D. paniculata* was chiefly the result of its exuberance. Otto Kuntze had used the adjective 'paniculata' as 'var. paniculata' for the same state (Revisio Genera plantarum, 3 p. 312; 1898), the coincidence accidental. The name 'elephantipes' entered into the synonymy by misidentification of a specimen; and Burchell earlier had made the same misidentification for his 3390 gathered at Zwartwaterpoort near Riebeeck East in the Albany Division; but he did not publish his identification. The entry of the name 'montana' into the synonymy is confused. Burchell's *Testudinaria montana* was *D. elephantipes* beyond all doubt. Ecklon

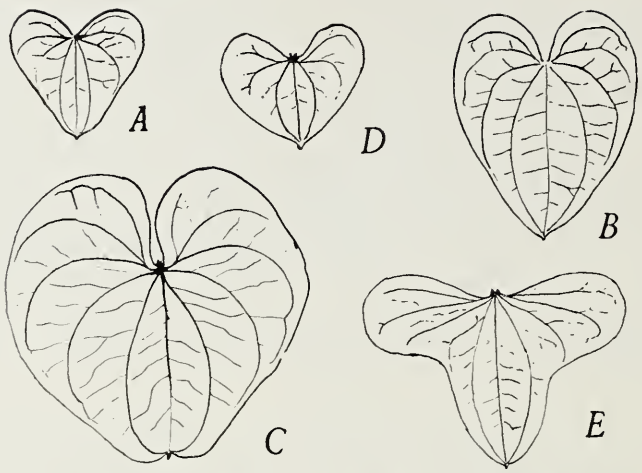

Fig. 5. The forms of leaf in *D. sylvatica*. *A*, typical of the plant in the Cape Province (from Galpin 8188, obtained in the Queenstown Division). *B*, from Marloth's *T. multiflora* obtained in the Zoutpansberg Division of the Transvaal. *C*, the largest leaf of var. *rehmanni* that has been seen (Harrismith Division, Putterill). *D*, from Burchell's no. 3390 which he thought to be *D. elephantipes*. *E*, a large leaf from var. *paniculata*, cultivated at Kew. All × ½.

and his associate Zeyher apparently put the name onto a specimen of *D. sylvatica* which reached Berlin. Dr. R. Knuth, working there, sorted out a number of specimens which presumedly matched Ecklon's and Zeyher's. I can prove from his citings that most of them are *D. sylvatica* and assume that all were. He names Sprengel as the authority, which is wrong, for Sprengel merely applied the name 'montana' to Burchell's plant. The authority for this *Dioscorea montana* is R. Knuth. Marloth's *T. multiflora* is founded on a single plant with unexpectedly small capsules and has no importance until it is shewn not to be an abnormality, but heritable.

A lotion is made from the tubers of *D. sylvatica* for outward application and assuredly saponin is the remedial substance that it contains (see Marloth, Chemistry of S. African plants and plant-products, 1913, p. 6).

Distribution by administrative divisions. Cape Province from south to north. George; Humansdorp; Knysna; Uniondale; Uitenhage whence came part of Ecklon's 892, the rest is labelled Albany; the locus classicus is therefore in one of these two divisions; Port Elizabeth, by no means rare; Adelaide; Albany, by no means rare; Somerset East; Queenstown;

Cathcart; Stutterheim; Bathurst; Elliotdale and Komgha. The varieties *paniculata* and *brevipes* occur as well as the type.

Natal, by no means rare to the south of Durban near the coast where the sandy bush suits it, and frequent in the mountains, usually in the varieties *paniculata* and *brevipes*, rarely in the var. *rehmanni*. Umzinti; Estcourt; Utrecht; Inanda; Weenen and Vryheid; Zululand, but those who have collected it in Zululand have been careless in giving their localities.

Orange Free State Province, in var. *brevipes* and intermediate forms towards var. *rehmanni*. Near the Natal border in the division of Harrismith.

Transvaal, usually var. *brevipes* in the south and var. *rehmanni* in the north and the east. Divisions of Heidelberg; Johannesburg, Rustenburg; Waterberg; Wakkerstroom; Ermelo; Belfast; Barberton, apparently common; Pilgrimsrust; Lydenburg; Potgietersrust, whence came Leendertz's no. 1510 which Burtt-Davy took for a type of his *T. brevipes*; Pietersburg and Zoutpansberg from which came the types of *D. rehmanni* and *T. multiflora*.

Southern Rhodesia, generally var. *brevipes*. Divisions of Makoni; Bulawayo; Victoria; Mazoe; Inyanga; Umtali and Manica. The altitudes recorded are between 4300 and 5550 feet.

Northern Rhodesia. Livingstone division, at Bombwe, Martin 309/32.

Basutoland. Phillips in his account of the botany of the Leribe plateau names it, not as a plant proved to be there, but as a plant not unlikely to be found.

BOOK REVIEWS

THE *Stapelieae* OF SOUTHERN AFRICA. By C. A. Luckhoff. Cape Town. A. A. Balkema. 1952. 100/-.

This is an exceedingly fine botanical picture book which should appeal to all succulent enthusiasts and to those interested in the beauties of our flora.

The book is not strictly a popular one nor is it either a collector's handbook nor a botanical monograph on the plants concerned, though it has some of the features of each of the above categories. It is perhaps best described as a pictorial supplement to the monograph on the *Stapelieae* by White and Sloane which was published a few years ago.

The volume contains 280 pages, of which considerably more than half are illustrations, the majority of which are really excellent photographs of the flowers of the plants. There are also some coloured life-size drawings and a number of most useful line-drawings illustrating the structure of the corolla and the corona. The photographs represent a selection but by no means all the species. All the genera occurring in S. Africa are illustrated though in one case by a line drawing only. The larger genera are illustrated by a selection of species. The photographs are of very high quality and clearly show the diagnostic features of the flowers. These photographs represent the outcome of prolonged and patient study in the field. While most were taken by the author, a number are the work of Mr. H. Lang. Both photographers are to be heartily congratulated on their results.

The flower is enlarged in most of the photographs. In a few this enlargement has been a little too great but in the great majority the features of the corolla and corona are well shown. The magnifications used vary a good deal and until this is grasped misleading ideas as to real size are liable to occur. For example on pp. 120–1 flowers pictured as the same size are in fact very different.

The flower photographs are of such excellent quality and show the details so well that one cannot help wishing that rather more of the habit and characteristics of the stem could have been included. This would have been of great assistance in identification of plants which have a short flowering time and which are so often seen only in a non-flowering state.

The text accompanying the illustrations is in both English and Afrikaans. The descriptions and keys to the genera and to the species are based on those in White and Sloane's monograph with only slight alterations. This taking over from the larger work has at times been

done without due consideration. In a work on the plants of Southern Africa it seems scarcely necessary to include genera or groups of species which do not occur in S. Africa or in Africa at all. Again, in some points the keys and the legends to the photographs do not agree. An example is to be seen in *Caralluma lateritia* which is treated as a species on the plate but as a variety in the key, *C. lutea* v. *lateritia*. In some cases the author has adopted a non-committal attitude which is perhaps unfortunate. The genus *Lückhoffia* is included as a full genus though rather strong evidence is brought forward to show that it is most probably of hybrid origin. The name *Pectinaria Villetii* is proposed for what appears to be a new species and is included in the key but no diagnosis is given. Such a creation of a "*nomen nudum*" is bound to lead to nomenclatorial difficulties.

For ease of reference and as a help to the non-specialist in identification, it would have been an advantage if the numbers applied to the species in the keys had been repeated on the illustrations.

There is no mention at all of the flowering season of the species nor of the localities where they are found beyond a general statement of occurrences in the provinces. The omission of time of flowering is unfortunate especially in plants whose beauty is so strikingly brought out in the photographs. The lack of reference to localities is perhaps understandable in a group of plants many of which are rare and some of which are liable to or on the verge of extinction as the author points out. In the interests of preservation it is justifiable not to advertise localities when exploitation by ruthless collectors is possible but from the botanical point of view it is regrettable. In a group of very highly specialised plants such as these much information on the probable lines of evolution and interrelationships could be obtained from a real knowledge of their distribution.

The volume is well produced and the reproduction of the photographs is excellent. The type is clear though there are a number of misprints, most of which are obvious. One or two call for notice. In the index to illustrations the list for *Stapelia* stops at the letter 'p'. On p. 77 it reads ". . . mis-spelled *Stapeltonia*" (*sic*) though in the Afrikaans version, p. 82, the mis-spelling is correctly given as *Stapletonia*.

There is no doubt that the real excellence of the photographs should ensure the success of this volume. For the collector it will be a most useful handbook. For the botanist it forms a very attractive supplement to more complete works.

R. S. Adamson.

FLORA OF THE BRITISH ISLES. By A. R. Clapham, T. G. Tutin and E. F. Warburg. Cambridge University Press. 1952. pp. lii & 1591. 50/-.

The appearance of a new flora of the British Isles may not at first appear of especial interest to S. African botanists, but this flora contains a number of features which are not often included in local floras, some of which are the result of the more modern studies of taxonomy. Their presence marks this book as a definite advance and makes it a model to be aimed at by workers in other regions.

Among its special features may be mentioned the large number of alien plants included, a rather important feature in a country with such prolonged cultivation. Again for each species the life-form is given: these are based on an elaborated form of Raunkiaer's scheme. The method of pollination and, where entomophilous, the actual agent is noted. Of especial interest is the inclusion of the number of chromosomes where this is known. It is of interest and of great contrast to this country that so high a proportion are known. The notes on habitat are more detailed than is common in floras. The general distribution of each species outside the British Isles is also given.

These various features represent the outcome of prolonged study of the flora. Many of them cannot be attempted here where it will be many years before the necessary information is available. Their inclusion undoubtedly greatly increases the value of the flora for ecologists and others who require identifications but are not taxonomic experts. Indeed, this flora is expressly stated to be written for those who are not taxonomic specialists. The descriptions are simple and clear. The keys are based on easily observed features and seem to be adequate. Many of the more critical genera are illustrated by very useful line drawings of special features. In some genera, such as *Rubus* and *Hieracium*, where numerous "micro-species" have been described, no attempt is made to include all; instead the key gives the sections under which only a few of the commoner "species" are described. For details the student is referred to recent monographs.

Throughout the book there is a tendency to subdivision of the larger families and genera. The species concept too is restricted. Varieties are not included but some species are divided into subspecies.

Though the volume runs to over 1,500 pages it is printed on thin and reasonably opaque paper and is convenient in size, neither unduly bulky or heavy. The type is clear, and each page has a heading with the family and genus.

A supplementary volume of illustrations is promised and should be eagerly anticipated.

R. S. ADAMSON.

INDEX OF PLANT NAMES VOL. XVIII.